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THESIS

A COMPARISON OF THE ACQUISITION PROCESS
FOR SHIP CONSTRUCTION PROJECTS OF THE
ROYAL AUSTRALIAN NAVY AND THE UNITED STATES NAVY

by

David P. R. Caton

June 1981

Thesis Advisor: W. H. Cullin

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This thesis compares the processes of acquisition for ship construction projects in the Royal Australian Navy and the United States Navy. It examines the problems associated with government furnished equipment with regard to specifications, timing, quality assurance, and cost. The requirements of standardisation, commonality, and interoperability with allied nations is also discussed.

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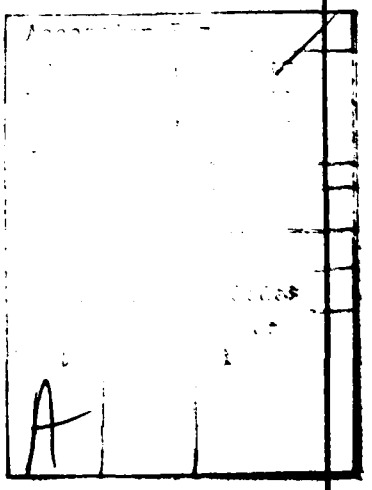
A proposal for a replacement shipbuilding programme for the Royal Australian Navy is presented, whereby the fleet would be continually updated with new ships and new weapon systems on a cyclical basis. This proposal would increase involvement by Australian industries in warships for Australia. It would also solve many of the current problems with government furnished equipment, and provide a substantial degree of standardisation.



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A Comparison of the Acquisition Process for Ship Construction Projects of the Royal Australian Navy and the United States Navy

by

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TABLE OF CONTENTS

LIST OF FIGURES

I. INTRODUCTION

A. GENERAL

The topic for this thesis arose from the researcher's exposure to the acquisition and contracting procedures used by the United States Department of Defense in the procurement of goods and services for use in the United States Navy (USN). The researcher's direct involvement with procurement practices in the Royal Australian Navy (RAN) consisted of two years on the staff of the Director, Naval Equipment Production from 1973 to 1975. From these experiences, it was recognised that some differences between the acquisition policies and procedures of the Navies existed, and that there was a possibility of each Navy learning from the other.

The RAN, the Australian Department of Defence, and the Australian Government have recognised that problems in this area exist, and have initiated or been involved with several recent studies in an effort to strengthen the procurement activities. Some of the major studies are:

- Review of Project Management in the RAN, 11 July 1978, by Captain D. J. Martin, RAN, et al., [Ref. 19];
- Joint Committee on foreign Affairs and Defence, Australian Defence Procurement, November 1979, (Katter Committee), [Ref. 15];
- Procurement of Equipment for New Construction Ships, March 1980, D. F. Bruce, Chairman. (Bruce Report), [Ref. 31]; and
- Report of the Naval Procurement Working Party (NAVPRO), 28 November 1980. [Ref. 25]

These reports clearly indicate that there are several problems to be overcome, and propose changes to the existing policies, organisations, and procedures to strengthen the acquisition process and to assign responsibility and accountability to appropriate areas within the RAN.

B. OBJECTIVES OF THIS RESEARCH

The objectives of this research are to compare the acquisition processes of the United States Navy and the Royal Australian Navy for ship construction projects, and to examine the problems associated with government furnished equipment with regard to specifications, timing, quality assurance and cost. The requirements of standardisation, commonality and interoperability with allied nations are also discussed. Recommendations in these areas will be presented.

C. RESEARCH QUESTIONS

1. Primary

What are the significant differences in the ship acquisition procedures between the RAN and the USN, and what steps are being taken, or could be taken, to overcome major problems encountered in each of these procedures?

2. Secondary

a. What are the problems in the ship acquisition procedures regarding government furnished equipment (GFE)?

b. For GFE, where should the emphasis with regard to specification, timing, quality assurance and cost be?

c. What requirements exist for standardisation, commonality and interoperability with allied nations?

D. SCOPE, LIMITATIONS AND ASSUMPTIONS

This research has concentrated mainly on the project management aspects of ship construction projects. The project or programme manager is the driving force behind the project. To produce a viable end product, the project manager must consider all relevant aspects put to him by specialist groups.

In an effort to cover as many aspects as possible, detailed analysis of any one area is limited. The arguments may therefore appear simplistic in some areas, however, it is hoped that by presenting the arguments here it will prompt deeper analyses by others in those areas of concern or interest.

It is assumed that the reader has some basic knowledge of the requirements and procedures for obtaining defence-related equipment.

As Australia and the United States of America have some language differences in the spelling and use of some words, this thesis is written in the "Australian" English language.

E. METHOD OF RESEARCH

The descriptions and ideas in this thesis have resulted mainly from searching relevant literature. The literature studied included: rules, regulations and instructions laid down by the appropriate departments; and reports, studies and books written on the subject of acquisition of ships and government furnished equipment. An opportunity to visit Seattle to talk with the ship's company of HMAS CANBERRA, the Supervisor

Shipbuilding Conversion and Repair, and Todd (Pacific) Shipyards, Inc., revealed some concerns relating to government furnished equipment for the Guided Missile Frigate (FFG-7) programme.

To obtain sufficient information from Australia, the assistance of a liaison officer on the Chief of Naval Materiel's staff was obtained.

F. DEFINITIONS AND ABBREVIATIONS

As the acquisition process in both countries involves many committees, a list of their abbreviations, members and responsibilities is included at Appendix A. There are no significant differences in the terminologies used in the acquisition process, however, it is worthy to note here the definitions of "procurement" and "acquisition."

The current definition of "procurement" used by the Australian Joint Services is given in JSP(AS) 101 as:

> "The process of obtaining personnel, services, supplies and equipment."

The U.S. Defense Acquisition Regulations (DAR) Section 1-201.13 says that:

> "Procurement includes purchasing, renting, leasing, or otherwise obtaining supplies or services. It also includes all functions that pertain to the obtaining of supplies and services, including description (but not determination) of requirements, selection and solicitation of sources, preparation and award of contract, and all phases of contract administration."

The Federal Acquisition Regulations (FAR), designed to provide uniform regulations for all executive departments and agencies of the U.S.Government, uses the term "acquisition" in place of "procurement," the latter term being synonymous with "contracting," as a subset of acquisition functions. The definition of "acquisition" is essentially the same as that expressed in the DAR for "procurement." The Naval Procurement

Working Party in Australia in their report [Ref. 25] proposed a definition for "procurement" which is almost identical to that for "acquisition" in the FAR.

Throughout this thesis, the two terms will be used as synonyms.

G. ORGANISATION OF THIS THESIS

Any comparisons between procedures in different countries are difficult to make. There are many variables impacting on the procedures which are unique to a particular country or organisation. Chapter II therefore provides some background information on both countries that impacts on the requirements and procedures for ship construction projects. Areas considered are the basic demographic nature, the structure of the governments with their specific rules, the structure of the respective defence departments and the organisation and size of the navies.

Chapter III begins with a description of the RAN acquisition process, followed by a description of the process used by the USN. A comparison of both processes is then made. By using a series of flow diagrams for the various phases of the acquisition process, these differences, albeit few in number, are easily seen. Areas where improvements are considered appropriate are then suggested.

The specific problems and requirements of government furnished equipment are described in the next chapter, Chapter IV. An attempt has been made to highlight the areas where improvements would be most beneficial. The areas of standardisation, commonality and interoperability with allied nations are then discussed.

As a result of the descriptions and discussions presented in these three chapters, a proposal for a shipbuilding programme for the Royal

Australian Navy is presented in Chapter V. There would be many problems in implementing this proposal, however once the programme is running, it should be easy to manage, it should streamline the introduction of replacement ships into the RAN, it should involve more participation by Australian industries, and it should improve the morale and efficiency of those at sea and ashore who are involved with ships. The proposal is presented as an idea requiring further in-depth study. Individual aspects of the proposal could be acceptable without adopting the proposal in its entirety.

The final chapter summarises the thesis and presents the major conclusions and recommendations embodied in the thesis.

II. A LOOK AT THE COUNTRIES

A. GENERAL

This chapter will discuss the major differences between the countries of Australia and the United States of America which impact on the requirements for Naval shipbuilding in each country. The areas of concern are the physical nature of the countries, the government structure and policies, the defence department and navy department organisations, and the industrial base.

Australia is the smallest continent, but one of the largest nations with an area of nearly 3 million square miles (7.75 million sq. km.). This equates to the land area of the United States excluding Alaska and Hawaii. The population of Australia, however, is extremely small in proportion, being 14-1/2 million people compared to 220 million in the USA. Both countries have abundant resources of most raw materials including the common, precious, and exotic metals, petroleum and coal.

B. GOVERNMENT STRUCTURE AND POLICIES

Both Australia and the USA have a system of government based on the idea of federalism where the powers of government are divided between a central authority and a number of constituent territorial units. The division of powers is laid down in the respective constitutions. The national government has the responsibility for all matters of the national interest. The state governments complement the activities of the national government and provide a largely self-governing legislature to each state. A third tier exists in the structure of both systems at the local

government level to administer the cities, towns, municipalities and counties or shires.

In the USA, a presidential form of government, characterized by a chief executive (the President) elected for a fixed term and independent of the legislature (Congress) exists. Australia practices a parliamentary system where the executive is composed of a prime minister and the cabinet who are themselves members of the legislature (Parliament). [Ref. 18:21-22]

Bicameral legislative branches exist in both countries, and the chambers have the same names: the House of Representatives for the lower houses and the Senate for the upper houses. Australia's lower house is elected for a three year term compared to the term in the USA of two years. The Australian Senator is elected for a six year term as is his American counterpart. Half of the Senate is elected every three years in Australia and a third elected every two years in the USA.

Additionally, each country has another branch to its government. This branch is the Judiciary which is responsible for interpreting and applying the law in those cases brought before the courts.

There are three main political parties represented in the Australian Parliament: the Liberal Party, the Australian Labor Party, and the National Country Party. Whilst each party represents democracy and the rights of individuals, there are significant differences in their other platforms. The Liberal Party encourages individual initiative and private enterprise. The Labor Party, strongly supported by the trade union movement, is more socialistic, believing in equality of opportunity using federal resources. The National Country Party originated in the

rural sector but is also concerned with the development of manufacturing industries. The Liberal and Country Parties usually form coalitions at both Federal and State levels. [Ref. 2:24] The two major political parties in the USA had opposing views in their early stages: the Democrats wished to restrict the powers of the Federal Government while the Republicans favoured a strong National Government, with aid to business and commerce. [Ref. 18:409-414] Latterly, however, the party lines have overlapped considerably and each no longer represents either strong liberal or strong conservative ideals. [Ref. 13:72]

Each country has established regulations and social programmes impacting on the procurement of goods and services for use by the government. The USA has the Buy American Act, imposing restrictions on the purchase of supplies of foreign origin, and the Small Business Program favouring certain contract awards to be made to small or disadvantaged companies. [Ref. 8:14] Australia, in recognising that Australian industries do not have the capability to develop and produce major equipment items needed for government procurements, has established the Australian Industry Participation (AIP) Programme, which requires overseas suppliers to involve Australian industries in the production of the system being purchased, or a related product. The object of this programme is to attain a greater level of self-reliance in defence supplies and to increase the technological advancement of key industries. [Ref. 16:21]

C. ORGANISATION OF DEFENCE AND NAVY DEPARTMENTS.

1. Australia's Department of Defence

The Minister for Defence is responsible to the Parliament for the conduct of all defence matters, including civil defence. Under

the Minister is the Department of Defence. Figure 1 displays the top organisational structure of the Department. Its role is the development of policies and advice to the Minister for Defence, a the coordination and execution of approved policy, and the direction of the Defence Force.

At the top of the Departmental structure, jointly responsible to the Minister is the principal civilian advisor, the Secretary, Department of Defence, and the principal military advisor, the Chief of Defence Force Staff (CDFS). The Chiefs of Staff of the Navy, Army and Air Force exercise command of their respective services under the CDFS. [Ref. 2:82]

Administration of the Defence Force is the joint responsibility of the CDFS and the Secretary, except in relation to matters coming within the command vested in the CDFS and the Chiefs of Staff. The latter advise the Minister on matters relating to their professional military responsibilities. The CDFS and the Secretary each deal with the Government on matters of individual concern, but work together over the range of activities which are of joint concern.

The functional organisations and divisions under the Secretary cover the following areas: Supply and Support, Defence Science and Technology, Manpower and Financial Services, Strategic Policy and Force Development, and Management and Infrastructure Service. [Ref. 16:77-85]

The manpower elements are responsible for developing policies to manage and control defence uniformed and civilian personnel. The Secretary has statutory responsibilities to ensure regularity of expenditure and proper use of public funds within the Department.

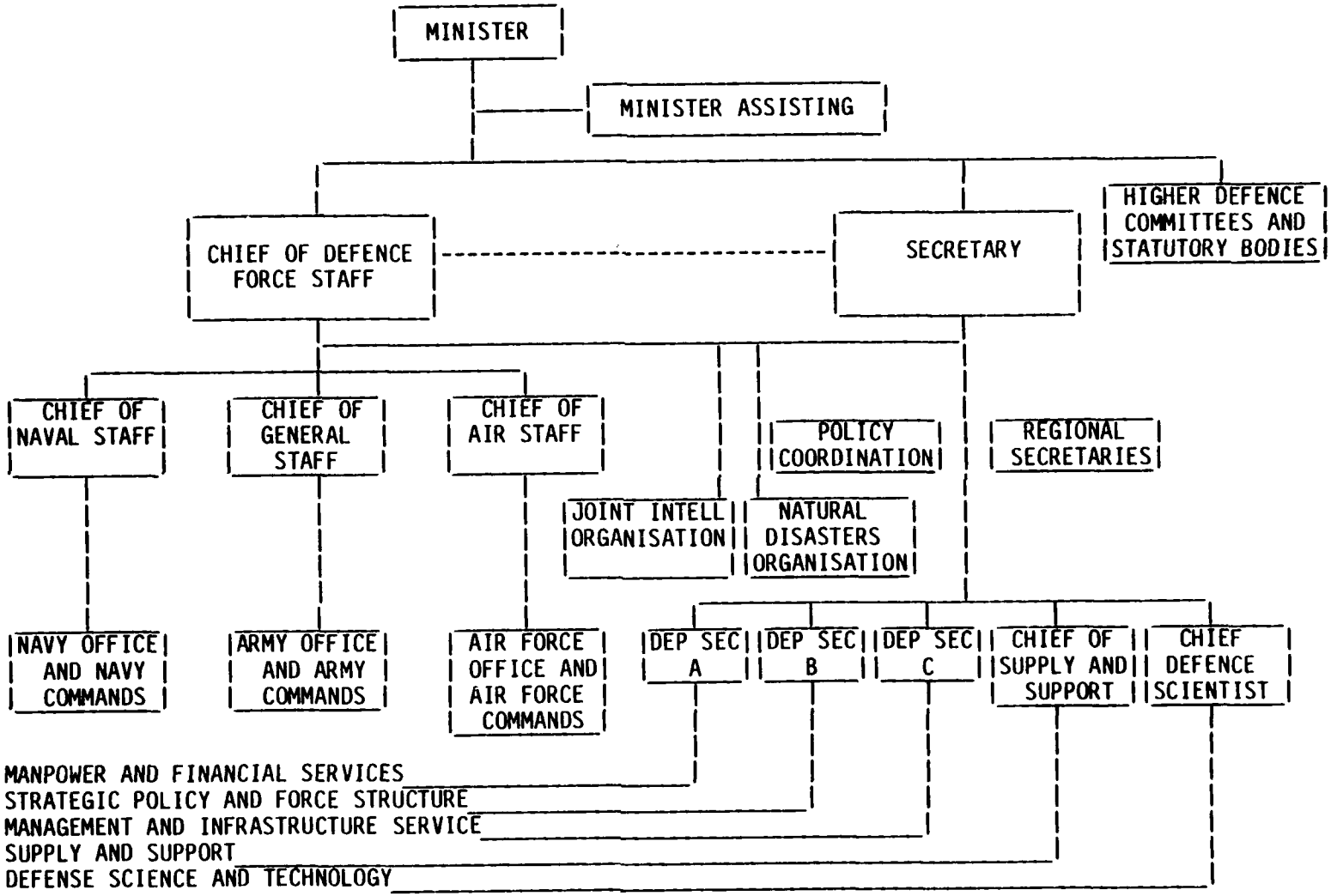

Figure 1. AUSTRALIAN DEFENCE ORGANISATION

Australia's international defence relations and strategic policy, analysis of force structure and associated major weapons and equipment requirements, the development of equipment proposals in support of defence objectives within financial resources, come under the auspices of the Strategic Policy and Force Development Organisation. With this organisation are the "dual hatted" Chiefs of Materiel, with responsibility to both the Secretary and their Service Chief. They are responsible for the development of major equipment proposals put forward by their Service, through the various defence processes of analysis and control, all the way to the decision point. The financial management of the Five Year Defence Programme (FYDP) is also within this organisation.

The Management and Infrastructure Services Organisation provides for the computing requirements of the Department. They are also responsible for the formulation and implementation of defence industry, material and procurement policies. The Defence Industry and Material Policy (DIMP) Division has this role and, in particular, for major equipment proposals, is responsible for the development, in close consultation with the Service concerned and other relevant functional divisions, of acquisition strategies, management arrangements, negotiation and implementation of Australian Industry participation proposals, and for advising on all these aspects in the decision making process.

The Supply and Support Organisation also uses the "two hatted" concept. The technical and supply areas of each service are represented here with the responsibility to the Secretary for the development and monitoring of the defence policy and provision of technical and policy advice.

The Defence Science and Technology Organisation is responsible to the Secretary for scientific advice in defence matters and the analysis of weapons systems and equipment. It maintains Australian research and development, monitors international programmes and undertakes trials and evaluation of proposed and existing equipment.

The Defence Organisation covers a wide scope which includes questions of strategic and international policy, conditions of service, procurement of sophisticated and expensive weapon systems, and the day-to-day management of a very large, diverse organisation. To manage this large organisation and to ensure all interested activities are involved in the decision making process, the Defence Committee system and the FYDP are utilized. The composition and responsibilities of the committees involved with procurement of major equipment are listed in Appendix A. The decision making process is ultimately bound to the Five Year Defence Programme (FYDP) system. It is the direct result of detailed consideration concerning development of particular force capabilities for the five years following in specific terms, and for three years following that in general terms.

A separate department, the Department of Administrative Services (DAS), is responsible for arranging contracts in relation to items in common use and undertakes most categories of purchases on behalf of all other departments, particularly the Department of Defence. DAS has three basic involvements in the procurement procedure: the invitation of tenders, the collation and despatch of tenders to Defence, and the issue of contracts and purchase orders, and contract administration thereafter. [Ref. 3:1]

2. Royal Australian Navy

The Royal Australian Navy is headed by the Chief of Naval Staff, a Vice Admiral. Under his leadership are the Fleet Commander, the Naval Support Commander, various Area Commanders, the Naval Dockyards and the Reserves. Additionally, Navy Office serves in a staff position. The RAN outline organisation is depicted in Figure 2. The Navy Office section is broken down into five functinal areas, as shown in Figure 3. As far as procurement of major equipment is concerned, each area has some responsibility. The Chief of Naval Operational Requirements and Plans (CNORP) determines the operational requirements and then passes the proposal to the Chief of Naval Materiel for eventual project direction. The Project Director consults the Deputy Chief of Naval Staff (DCNS) for logistics, the Chief of Naval Personnel for manpower and training requirements, and the Chief of Naval Technical Services (CNTS) for technical advice in the design, production and maintenance requirements.

The Royal Australian Navy has 16,500 regular personnel and 1,000 reservists. These uniformed members are supported with some 10,000 civilians employed within the Department of Defence. The naval forces consist of one ageing aircraft carrier of a little more than 20,000 tons (HMAS MELBOURNE), which operates Skyhawk and Tracker aircraft and Sea King helicopters; six conventionally powered submarines; three guided missile destroyers and two gun destroyers; and six destroyer escorts. [Ref. 11:87] Two FFG-7 class frigates have recently been commissioned and another two are being built in the USA. Additionally, a small patrol boat force, which is soon to be replaced and increased in size, support

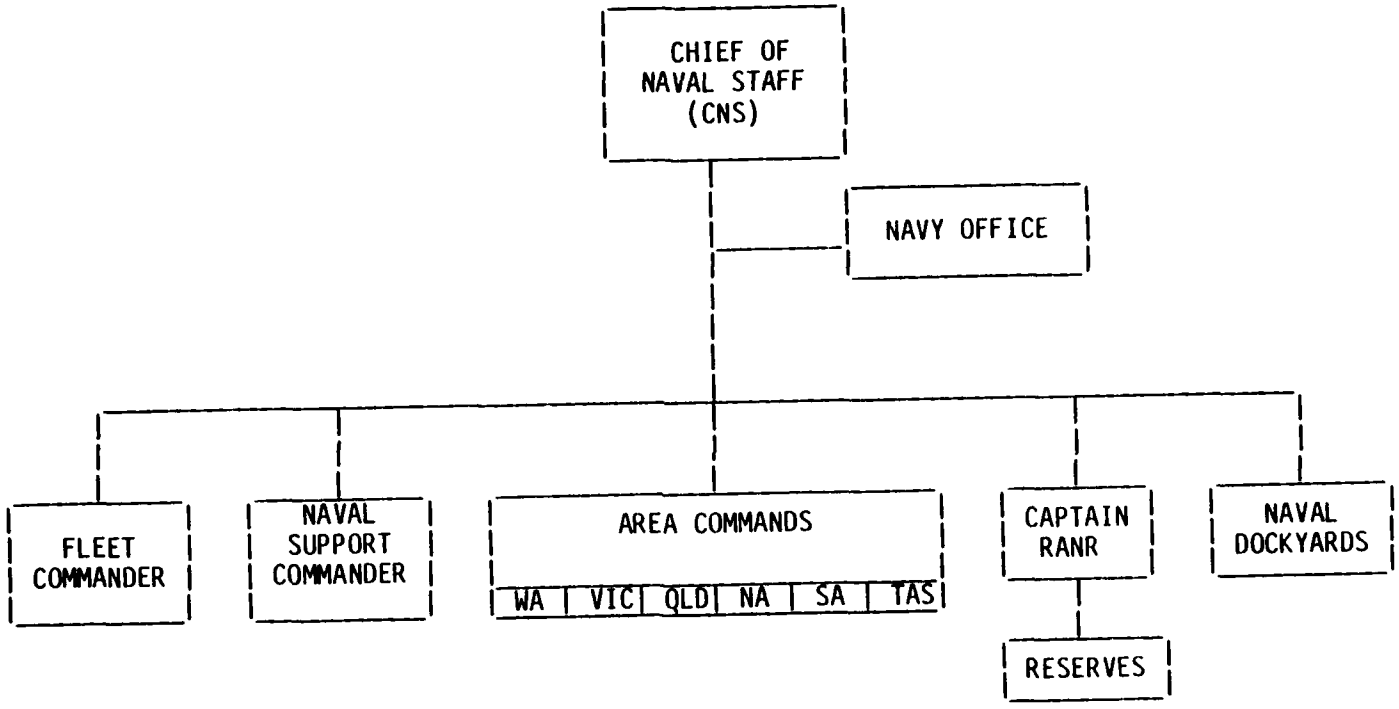

Figure 2. RAN OUTLINE ORGANISATION

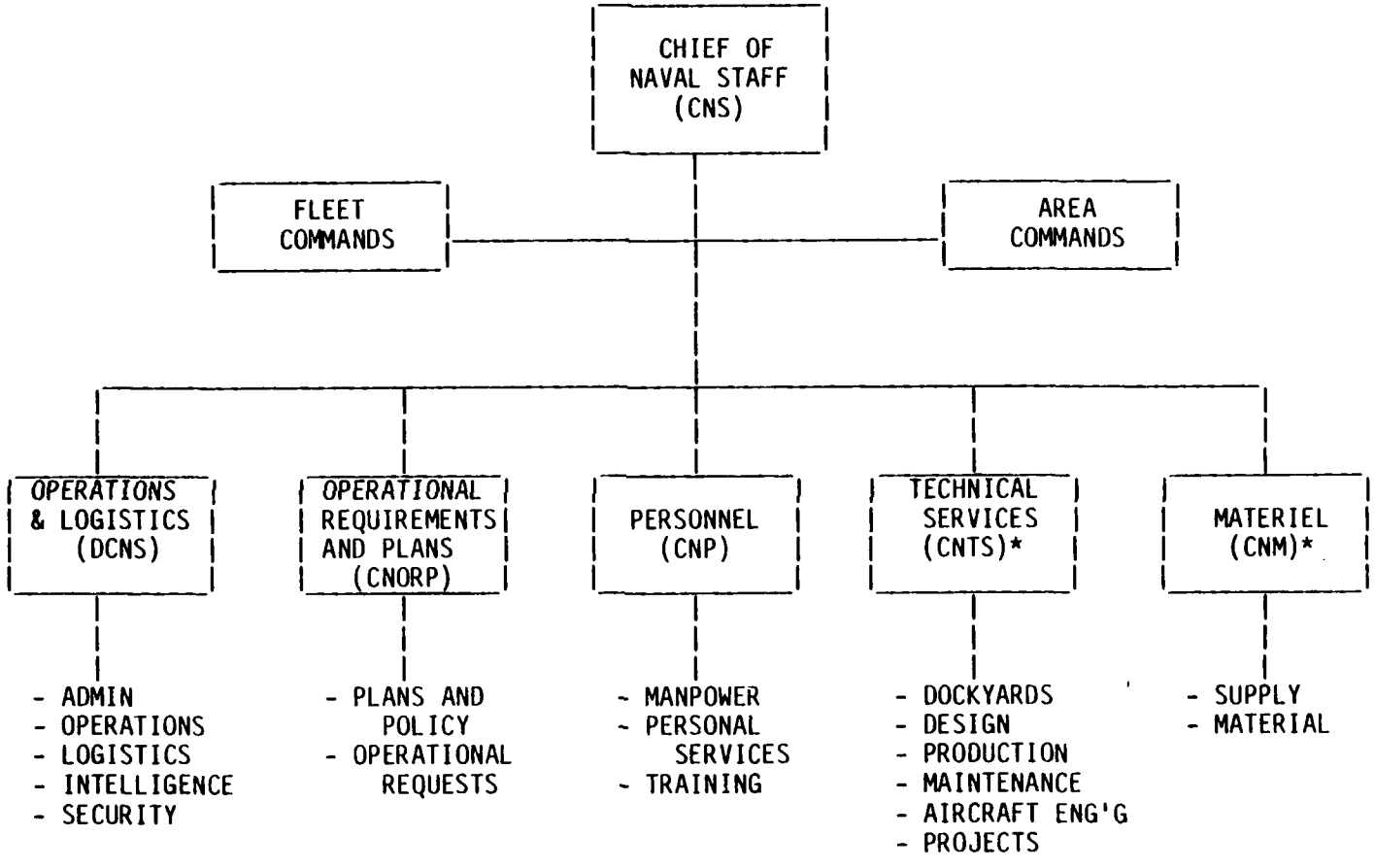

Figure 3. NAVY OFFICE ORGANISATION

vessels, hydrographic and oceanographic ships and landing craft complement the "fighting ships."

The carrier, the guided missile destroyers, the existing tanker, the submarines and one of the new patrol boats were all built outside Australia. The last front line operational warship to be built in Australia was a destroyer escort, HMAS TORRENS, completed in 1971. Since that time, only one oceanographic ship, one 6,500 ton landing ship (LST) and one patrol boat have been built in Australia. There are plans, however, for two destroyers (probably FFG-7 type), thirteen more patrol boats, two underway replenishment ships, a further LST, and some inshore and seagoing mine countermeasures ships all to be built in Australia.

3. U.S. Department of Defense

The structure of the U.S. Department of Defense organisation is far more complex than that of Australia. It is obviously a much larger organisation, so only those participants in the weapons acquisition business will be described here.

The Department is headed by the Secretary of Defense (SECDEF), a civilian appointed by the President, who, under the President, sets policies and directs the work of his department and the three service departments within it. His immediate aides concerned with acquisition are the Under Secretary of Defense (Research and Engineering), USD(R&E), the Under Secretary of Defense (Policy), USD(P), and the Assistant Secretaries of Defense, Comptroller, ASD(C), Manpower, Reserve Affairs and Logistics, ASD(MRA&L), and Program Analysis and Evaluation, ASD(PA&E).

The USD(R&E) is the principal advisor to the SECDEF for policies and reviews of all research, engineering and contracting. As the current

Defense Acquisition Executive (DAE), he chairs the Defense System Acquisition Review Council (DSARC) which in essence approves the advancement of a major system acquisition from one phase to the next. The USD(P) is responsible for reviews and advice on defence policies and related operational matters.

The Comptroller does the physical preparation of the Defense Budget and controls defence spending. He coordinates the acquisition process with the Planning Programming and Budgeting System, (PPBS). The ASD(MR&L) has responsibilities for logistics, energy, environmental impact, safety and manpower planning. He ensures that the logistic planning is consistent with the system hardware parameters, logistic policies and readiness objectives. The ASD (PA&E) is responsible for the evaluation of the individual weapons systems programmes, both from a standpoint of individual cost effectiveness and from an integrated force structure viewpoint. [Ref. 9]

All of the above officials are members of the DSARC, as is the Chairman, Joint Chiefs of Staff (JCS), who has the responsibility of reviewing force levels, strategy and tactical implications. The DSARC has advisory members drawn from other areas within the Secretary of Defense organisation.

The Department of Defense is regulated in its procurement activities by the Defense Acquisition Regulations (DAR), and claims against the government by civilian contractors are reviewed by the Armed Services Board of Contract Appeals (ASBCA). Two other agencies of significance to systems acquisition report to the OSD. The Defense Contract Audit Agency (DCAA) performs all necessary contract audits for DoD. They also

provide accounting and financial advisory services regarding contracts and subcontracts to all components of DoD who are responsible for procurement and contract administration. The Defense Contract Administration Service Office (DCASO) seldom becomes involved in the administration of a prime contract for a ship, but has a responsibility for contract administration for weapons procurement, the major portion of government furnished equipment (GFE). [Ref. 17:96-101]

Figure 4 shows the organisation of the U.S. Department of Defense as it relates to acquisition.

4. The United States Navy

The Department of Navy can logically be divided in two areas. The Secretary of the Navy is responsible to the Secretary of Defense for the activities of both the Office of the Secretary of the Navy and the Chief of Naval Operations. [Ref. 17:101] Figure 5 is a diagram of the formal organisation of the Office of the Secretary of the Navy, and of the Chief of Naval Operations.

a. Office of the Secretary of the Navy

This office is similar in structure to that of the Office of the Secretary of Defense (OSD), with the deletion of the Program Analysis and Evaluation Division. This activity is performed in the Systems Analysis section under the Chief of Naval Operations.

The Assistant Secretary of the Navy (Research, Engineering and Systems), ASN(RE&S), is responsible for all matters related to RDT&E within the Navy. The Assistant Secretary of the Navy (Comptroller), ASN(C), and the Assistant Secretary of the Navy (Manpower, Reserve

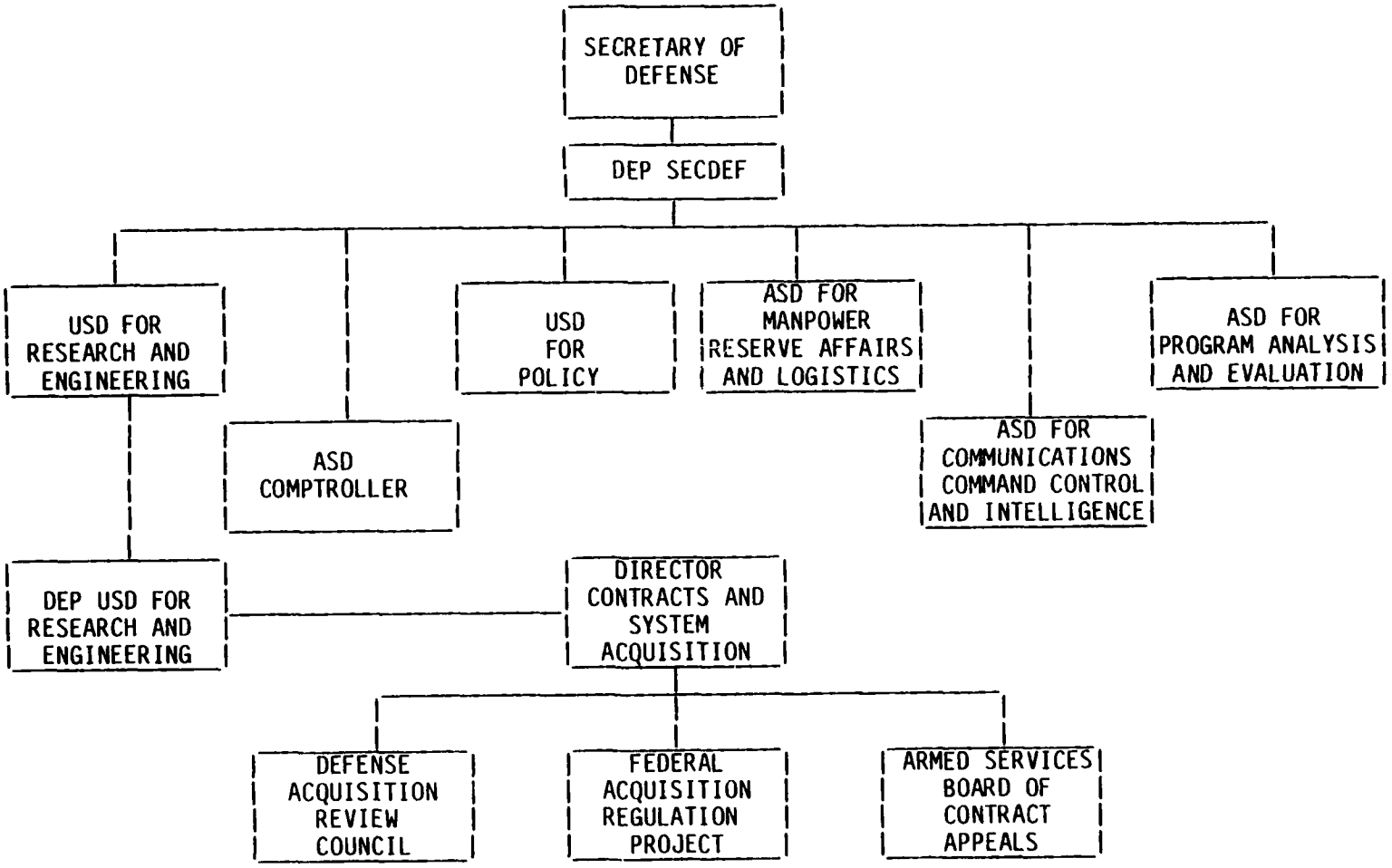

Figure 4. U.S. DEPARTMENT OF DEFENSE

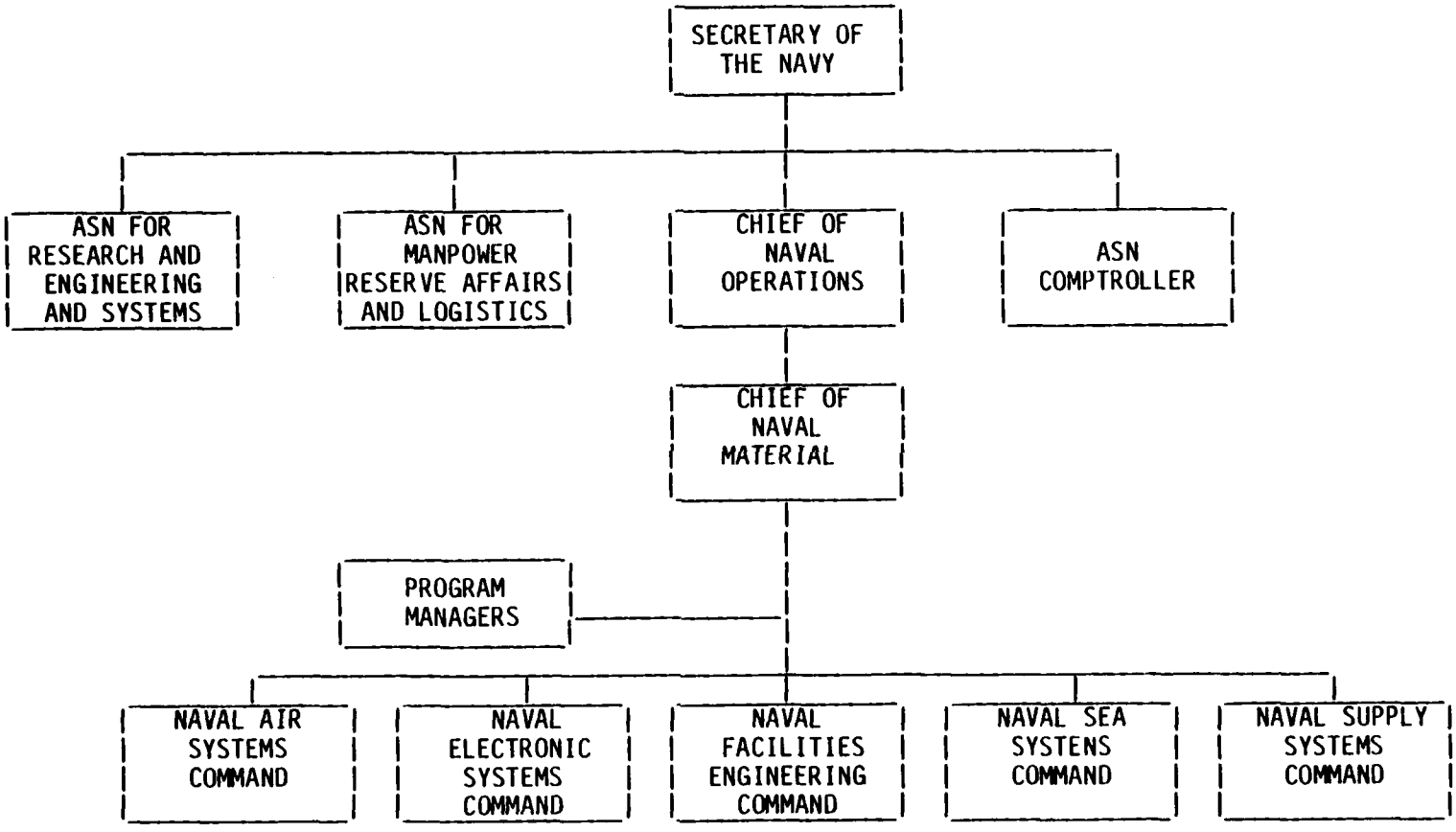

Figure 5. U.S. DEPARTMENT OF THE NAVY

Affairs and Logistics), ASN(MRA&L), have equivalent responsibilities to their counterparts ADS(C) and ADS(MRA&L).

As in OSD, a Service System Acquisition Review Council exists, DNSARC for the Navy, performing the same functions for the Secretary of the Navy as the DSARC does for the Secretary of Defense. DNSARC would review all naval acquisitions and make recommendations for major equipment to the DSARC.

b. Chief of Naval Operations

The Chief of Naval Operations (CNO) commands the operating forces of the Navy which includes several fleets, seagoing forces and the Marine Forces. He also commands the Naval Material Command, and the Bureau of Medicine and Surgery.

Within the organisation of the Office of the Chief of Naval Operations (OPNAV) are many areas with responsibilities for major system procurement. The operational requirements are provided by the line organisations including Manpower, Submarine Warfare, Surface Warfare, Logistics, Air Warfare and Plans, Policy and Operations. Their responsibilities include not only the material requirements, but also the operational readiness, tactical doctrine, training and related requirements. The Staff functions performed by such divisions as Program Planning, Intelligence, ASW and Ocean Surveillance, and RDT&E, provide basic coordination across all programmes and offices. [Ref. 30: Appendix E]

The Naval Material Command (NAVMAT) commanded by the Chief of Naval Material (CNM) is the single integrated material support agency responsible for the total weapons support systems development, procurement,

production and support, including human operator integration, depot maintenance, supply management, facility support and integrated logistic support planning. The organisation is divided into several systems commands responsible respectively for Air, Electronic, Facilities Engineering, Sea, and Supply. These systems commands are the providers of the weapon systems and support to the operating units of the Navy. Project Officers are established by CNM to accomplish specific tasks. [Ref. 17: 108]

In turn, the systems commands are divided further into areas dealing with planning, acquisitions, RDT&E and support.

The USN itself comprises more than 520,000 uniformed personnel with many civilians also employed. The size of the USN is very large, consisting of over 400 ships, the breakdown of which is too involved for this research.

An on-going shipbuilding programme does exist that has generated over 400 ships excluding patrol, landing, mine and service craft, during the last twenty years. Roughly 90 percent of these have been built in commercial shipyards, the remaining 10 percent in Naval shipyards; however, none have been ordered since 1967 from the latter. The number of destroyers and frigates built in this time frame is nearing 150. [Ref. 26: Chapter 1]

D. INDUSTRIAL BASE AND CAPABILITIES

The industrial base required to support the needs of a defence force could be considered as a hierarchy like that depicted in Figure 6. In Australia, the dependence is centered mainly in the upper echelons of this hierarchy, those areas controlled by the government, but in

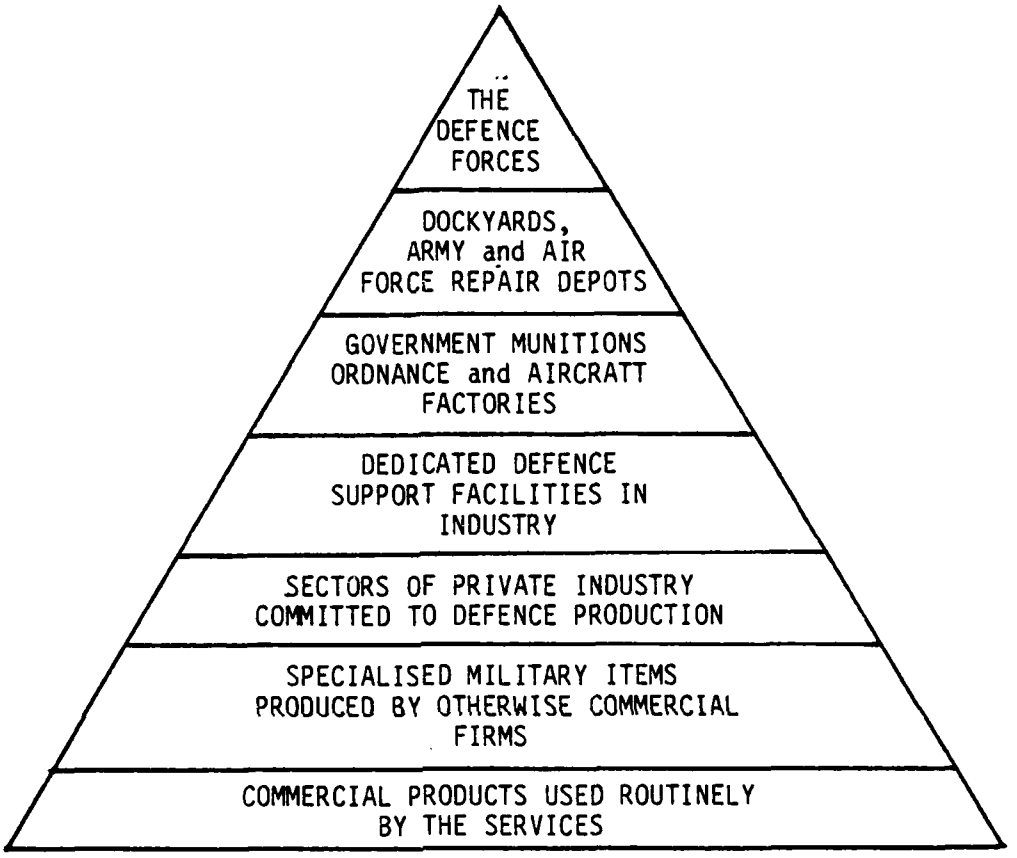

Figure 6. A DEFENCE INDUSTRIAL BASE

America, the majority of defence equipment is supplied by dedicated defence industries. There is a growing technological gap between the commercial industry requirements and the demanding technologies of advanced defence systems, making the dedicated industries necessary, but such firms can only continue if there is sufficient stability in requirements.

To describe and comment on the complete industrial base and capabilities of each country would require extensive research outside the scope of this thesis. However, it is worth highlighting some of the aspects of each country's industries that are related to the production of a warship.

1. Australia

Australia has a broad industrial base capable of producing a wide variety of manufactures. Tariff protection and quota restrictions on imported goods that have allowed the manufacturing industries to grow substantially in this area now account for about 25 percent of the gross domestic product. Essential technologies have not only been "imported" under licence from overseas industries, but have also been the result of much domestic innovation, resulting in overseas licencing of Australian-divised products and processes. [Ref. 2: 67]

Australian shipyards are of three types: Government owned and operated, Government owned/contractor operated, and contractor owned and operated. In the past, warships of destroyer and frigate size have been built in the former two types of dockyards. Patrol boats, and recently, amphibious heavy lift ships of 6,000 tonnes have been built in commercial yards. Commercial yards have the capacity to construct merchant ships up to 80,000 tonnes. A government bounty of 25 percent is provided on

commercial ships built in registered Australian yards for use in Australian waters or internationally under the Australian Flag. The largest naval vessel so far built in Australia is HMAS STALWART, a destroyer maintenance vessel of about 16,000 tonnes. Under construction at this time is a Fleet Underway Replenishment Ship of about 18,000 tonnes.

The Australian electrical industry produces a wide range of electrical motors, switch gear, control gear, and wires and cables. The electronics industry produces telecommunications equipment and is capable of producing complicated defence electronic requirements, such as the Mulloka Sonar and Barra Sonobuoys. Most of the electronics industries are Australian subsidiaries of big foreign companies, the notable exception being the Australian-owned Amalgamated Wireless (Australasia) Limited. [Ref. 2: 69]

The engineering industries produce a wide range of hand and machine tools, metalworking machinery, and materials handling equipment. Roller bearings, die casting, petrol engines, valves and control equipment, pumping and ventilating equipment are the products of the light engineering industries. Heavy engineering industries have produced railway rolling stock, diesel-electric locomotives, commercial motor vehicles, earth-moving, excavating and agricultural equipment and tractors. [Ref. 2: 69]

This brief account of the type of products capable of being produced in Australia shows that Australian industries are able to tender for many military items within reach of their technologies. However, the ability and willingness of firms to bid for the more technologically demanding defence equipments have been limited by the small

numbers required of each item, the high cost of developing a comprehensive tender response, and the need to establish specialised techniques and facilities. [Ref. 10: 38]

2. United States of America

America has an even broader industrial base than Australia. Because of the volume of defence requirements, there are many firms which are totally defence-related, with little or no application to commercial products. Such companies exist mainly to take advantage of the rapidly changing technology which has benefits in that the members of the company gain valuable training in the technical skills and that defence work has a favorable influence on investment analysis by some segments of the American public. [Ref. 12: 53]

There are over four hundred yards engaged in shipbuilding and repair in the United States; however, there are only twenty-six performing a significant amount of new ship construction. The U.S. Navy accounts for seventy-five percent of the new construction and this is undertaken in eleven privately owned yards, belonging to nine companies. Three of these yards are capable of, but only two currently engaged in, nuclear ship new construction. [Ref. 14: 516-527 and 26: Chapter 1]

United States shipbuilders, as Australian shipbuilders, are not competitive on the world market for commercial ships. Civil ship construction is subsidised up to 35% of total costs. [Ref. 14: 515]

The defence industry is characterised by a number of large conglomerates each with divisions covering the sectors of aircraft, ships, electronics and vehicles, however, there is a considerable overlap in the production and engineering skills required, as well as the

production equipment and facilities utilized. These industries are capable of producing any equipments needed to meet a perceived threat, but equally important is their ability to conduct much research and development to advance technologically.

E. SUMMARY

This chapter has identified some major aspects of both Australia and the United States of America which impact on the ship construction projects required to maintain the ability and advancement of the respective navies. The most obvious difference is the difference in the sizes of the populations resulting in less money available for defence spending and a consequent impact on the size of the navies and the shipbuilding requirements.

III. SHIP ACQUISITION PROCEDURES

A. GENERAL

This chapter will describe the acquisition procedures of both navies followed by a comparative section which will also suggest some possible problems and solutions to the procedures. It will be shown that the differences in the procedures are not particularly significant.

There have been many books written and studies undertaken about acquisition in the USA. It has not been possible in this research effort to cover each one, but it appears that the majority of these studies are directed at the physical process and not at the individual participants in the process. It will be demonstrated that the procedures are in the main quite streamlined, with some feedback loops for necessary amendments. However, the full internal passages of major equipment proposals within the navies are not discussed in detail here, and these areas could be the root of some of the current problems.

B. THE RAN SHIP ACQUISITION PROCEDURES.

1. Introduction

The ship acquisition process used in the Royal Australian Navy follows the procedures for Major Equipment Proposals. A major equipment is one which conforms to any one of the following criteria: [Ref. 1: Art 0214]

- has significant Defence policy implications;
- has significant Joint Service implications;
- is estimated to have a project investment cost (all onetime costs including research and development, prime equipment,

spares, modifications, training investment, facilities machinery and plant, test equipment and supporting equipment) of $10 million or more; or

- where the unit cost of individual equipment is estimated at $0.5 M or more (excluding spares, documentation, support, etc.).

This section will describe the procurement process, a simplified form of which is depicted in Figure 7. This process may be divided, somewhat arbitrarily, into four distinct stages, namely:

- the identification and specification of a general requirement for a force capability;
- the examination and analysis which lead to the seeking of a generic approval from the Government to acquire a specific capability;
- the selection of the equipment to be purchased; and
- the production and entry of the equipment into service.

These stages are shown in Figure 8.

The first two stages are sequential and cyclical and relate to the development and examination of major equipment proposals, and comprise an integral part of the Five Year Defence Programme (FYDP). The latter two stages are in general related to the particular Service only and thus become less dependent on the cyclical reviews of the FYDP, but still require appropriate Governmental approval at significant milestones.

The descriptions in this section have been developed from the appropriate Defence Instructions (General) [Ref. 4, 5, 6, and 7], and the RAN Project Management Manual [Ref. 2] and other material.

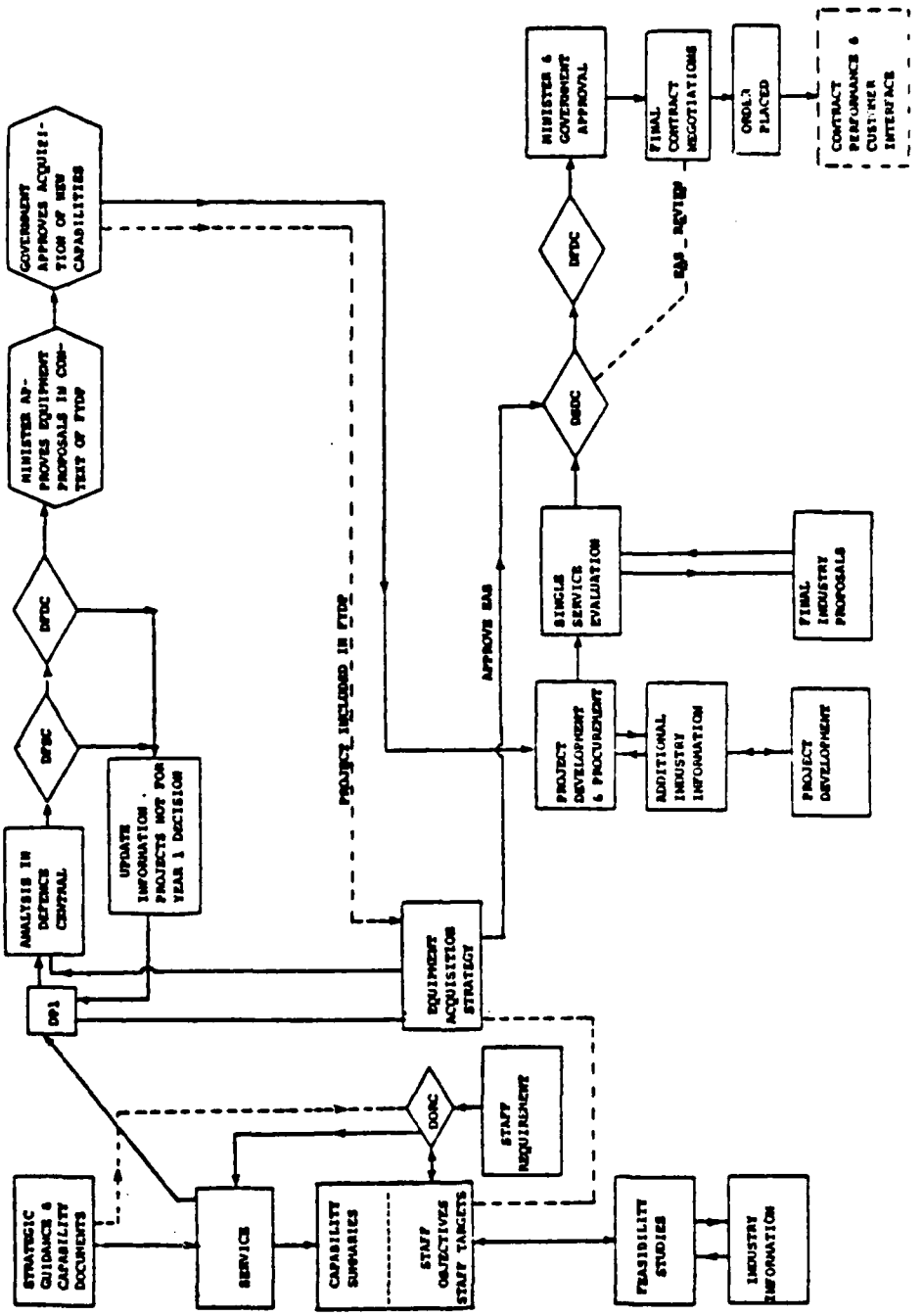

Figure 7. SIMPLIFIED EQUIPMENT PROCUREMENT PROCESS FOR AUSTRALIAN DEPARTMENT OF DEFENCE

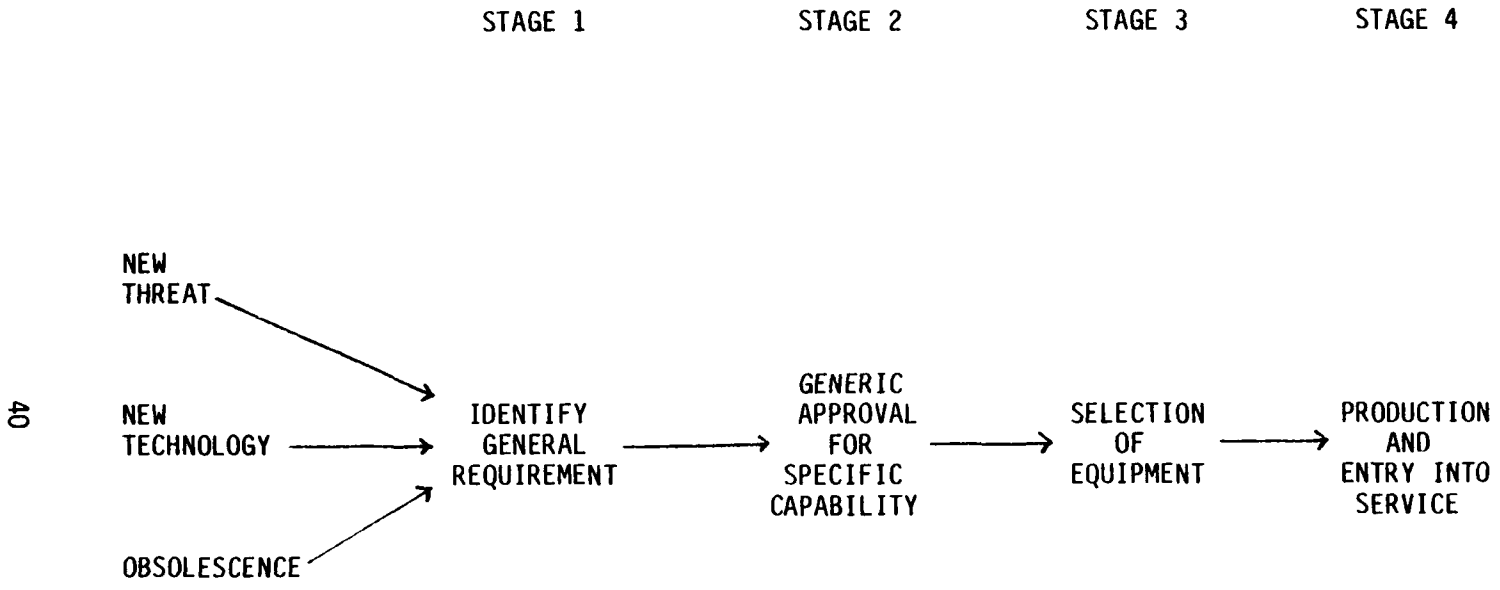

Figure 8. RAN MAJOR SYSTEMS ACQUISITION PROCESS

2. The Process

a. Identifying and Specifying a Requirement

The requirement for new equipment may originate from one of three ways: as a result of a new threat, new technology, or as a result of existing equipment becoming obsolescent.

Changes in Australia's strategic circumstances would constitute a new need. Strategic and other basic guidance (such as environmental or technical factors) are issued from time-to-time by the Defence Committee for defence planning and programming. Then the "Defence Force Capabilities" document is prepared by the Defence Force Development Committee (DFDC). This is a policy document which identifies the present military and other defence capabilities, their limitations and the extent to which capabilities should be developed or varied. This paper is not written in terms of specific equipments, but indicates the areas in which adjustments to existing capabilities are required.

The Services then formulate five-year programmes to initiate projects to affect the necessary adjustments to the force structure. Where this involves the need for new or updated equipment, the Services initiate proposals for their acquisition in the form of Staff Objectives, Staff Targets, or Staff Requirements.

The Staff Objective is a statement of a capability considered to be necessary for the effective conduct of operations. It specifies the relevance, importance and timing of the requirement and identifies potential options for meeting the requirement. A preliminary study is then conducted by the Service and the Defence Operational Requirements Committee (DORC) to confirm the need and to show that the concept is

practicable, and can be met technologically. Where this is done, the Service may proceed to a Staff Requirement. If there is any doubt, however, a Staff Target will be raised instead.

The Staff Target describes in broad terms the functions and desired performance of an equipment as a basis for determining the technical and scientific feasibility of the proposal, the risks involved and the indicative costs. The Naval Staff Target is first considered by the Naval Staff Requirements Committee (NSRC) and if approved is passed on to the DORC for endorsement.

The Staff Requirement is a statement of the function, main features and performance required of an equipment which can reasonably be expected to be available in the stated time frame to enable proposal requirement definition and approval for the acquisition to proceed. Staff Requirements are subjected to intensive intra-service evaluation before being submitted to the DORC for review and endorsement. The Staff Requirement is continually updated during the procurement process and can be used in the final source selection. A "sanitised" version may also be released to industry when assistance in the development of a future project may be required.

b. Seeking Generic Approval

With the Defence Operational Requirements Committee's endorsement of the Staff Requirement, the Service proceeds to issue the "Major Equipment Submission - Form DP1." The DP1 represents a detailed examination and justification of the proposal in a standard format covering the following major headings:

- justification and objective;
- assumptions;
- analysis of requirement;
- operational capability;
- technical risk;
- life assessment;
- force structure implications;
- compatibility of equipment;
- production aspects;
- operating, maintenance and logistic support;
- environmental impact;
- manpower implications;
- training implications;
- associated facilities;
- cost implications; and
- implementation programme.

The DP1 is submitted to the Force Development and Analysis Division (FDA) which, in conjunction with the relevant Service office, develops the Project Brief. This brief sets out the major points concerning the proposal together with an objective analysis of options and alternative views. Particularly significant or complex proposals are handled by a special group composed of all interested Services or Divisions, to ensure that all the aspects of the proposal are analysed.

The Major Equipment Proposals are then examined by the Force Structure Committee (FSC) in two separate review periods in each financial year. In the initial review (September to December), the

acceptability of each proposal is examined for its further consideration in the FYDP. Those proposals examined previously are reviewed for adequacy of development and continued relevance. The FSC consideration includes such items as: financial guidelines from the Government, the level of annual commitments in the FYDP, major equipment proposals likely to arise in the years beyond the FYDP, and general views held by the FSC and Defence Forces Development Committee (DFDC).

A consolidation of all equipment proposals, whether new or approved, both major and minor, manpower costs, defence facilities, operating costs, etc., is then prepared for consideration by the DFDC. Those proposals with final approval of the DFDC are submitted to the Minister of Defence for approval by the Cabinet in the context of the annual Budget. Depending upon the stage a project has reached, this approval will take one of the following forms:

- project approval -- approval of the generic type of equipment;
- project development -- approval to continue to develop and refine a project;
- project definition -- approval to enter into activities likely to involve outside agencies to more precisely define the scope and implications of the project; and
- evaluation -- approval for evaluation of contending equipments for a particular project.

These approvals do not constitute approval to expend funds, except where the Minister or his delegates may approve expenditure within

budgetary provisions and defined limits. Once Cabinet endorses Year One proposals further project development then proceeds towards procurement.

c. Selecting the Equipment to be Purchased

As a project moves through the FYDP from Year five to the year of decision, details of costing and the Required Major Characteristics are continuously reviewed and refined. For multiphased projects, such as ship construction, the design and production phases are separated and the approval for the first phase only will be given. At this time, a decision to design and produce in Australia or to purchase overseas may not have been finalised. This decision will depend primarily on the characteristics required. If the procurement is from overseas, this phase entails a project definition task; but if the design and production is to be undertaken in Australia, this phase is for the preliminary design only.

With such documents as the Major Characteristic and the sanitised Staff Requirement released to industry, commercial firms may now respond to an Invitation to Register Interest. If the tender is to be restricted to certain firms only, a Certificate of Inexpediency is required by Treasury regulations, and obtained by applying to the Department of Administrative Services (DAS).

Firms responding to the above are evaluated by DAS, Navy and Defence and a short list of firms is prepared who will now be issued a tender package for phase one and an invitation to tender.

The Navy's contribution to the tender package is usually the technical specification with any other additional or special requirements such as training or handbooks, etc., which are to be included in

the prime contract, and any particular contractual requirements such as delivery, testing, quality assurance and warranties. The tender responses are evaluated and as a result contract is, or sometimes more than one contracts are, awarded for the Preliminary Design Definition phase. Although competition is encouraged, the cost of several contracts is often prohibitive, and it is therefore most important that a detailed and firm cost estimate for following phases is available before this contract is awarded.

As an alternative to the Preliminary Design being obtained from commercial firms, an In-house Design may be developed.

From the Preliminary Design, if required, a further phase is used for a Final Design and preparation of a tender package for production.

d. Production

With the final design selected, approval is now sought to proceed further into final negotiations and placing of the order.

It may have been necessary for other procurements forming part of the overall ship procurement to be ordered before the contract for ship construction is awarded. These long lead items, as well as other acquisitions impacting in the project, form what is known as Australian Goverment Furnished Equipment (AGFE).

The construction of the ship is closely monitored and when completed is subjected to many trials, both by the shipbuilder and the RAN, before being accepted and commissioned into the Royal Australian Navy.

3. Managing the Process for Ship Projects

a. Developing the Five Year Defence Programme

The Five Year Defence Programme (FYDP) is formulated each year based on bids submitted by the Defence Organisations in support of endorsed policy objectives for ongoing activities and new capital equipment and facilities proposals. New or replacement ship proposals are considered as new capital equipment proposals.

Although the FYDP is prepared each year, it is in effect an updated version of the previous year's FYDP with necessary modifications for new requirements and revised priorities.

b. Organisation of Ship Acquisition

The Director General of Naval Operational Requirements (DGNOR) is responsible for the sponsorship of ship projects and the preparation of the Draft Naval Staff Requirement and Required Major Characteristics. For ship projects, a Project Director is normally appointed on approval of the Naval Staff Objective (NSO), the Naval Staff Target (NST) or the Naval Staff Requirement (NSR).

The Project Director is responsible to the Chief of Naval Materiel (CNM), who assumes overall management of the project from the date of approval of the NSR, or in the case of an NST, at the commencement of the feasibility study. Initially, the Project Director will be required to develop the appropriate documentation and be involved in project related activities. As the acquisition process proceeds, he becomes responsible for:

- planning and coordination of all project activities;

- placing agreed tasks with the functional areas for execution;
- maintaining a comprehensive review of physical and financial progress against planned targets; and
- taking or recommending action to correct any deviation.

The size of the Project Office will vary, depending upon several factors, from a part-time Project Director to a fully dedicated Project Office. No two projects are exactly the same and so the composition of the Project Office is regulated by the timing, complexity and workload, priority, cost and availability of manpower.

A matrix Project Management system is usually employed in the RAN, to make the most effective use of manpower resources and the benefits of functional experience. The functional areas provide the appropriate involvement in the Project. The level of effort required of each functional area is spelled out in the Project Management and Acquisition Plan.

c. Project Management Documentation

Two major planning documents are used to cover the entire period of a major project, from the formulative stages to the entry of the equipment into service: the Equipment Acquisition Strategy (EAS) and the Project Management and Acquisition Plan (PMAP).

(1) Equipment Acquisition Strategy (EAS). The EAS defines the parameters and provides the framework within which all participants in the acquisition of major equipment are to work. It establishes the nature and sequence of activities, outlines the strategy to be used and the time frame in which the procurement is to be conducted. The EAS for

each specific equipment acquisition is currently prepared by the Defence Industry and Material Policy Division (DIMP) but there are indications that this will become the responsibility of the Chief of Naval Materiel (CNM) in conjunction with DIMP. It is usually developed after the Staff Requirement has been endorsed by the DORC.

The events and activities identified and the matters normally addressed in the EAS are:

- preparation of and release dates to industry for the Naval Staff Target/Requirement and associated documents including Request for Proposals;
- early development of comprehensive capability specifications for both prime and support equipment;
- estabalishment of maintenance support and training requirements;
- development of related requirements and offset programmes for Australian Industry;
- preparation of tender schedules for the conduct of feasibility studies, project development, contract definition exercises and equipment acquisition with prospective suppliers; and
- tactics to be employed and the methods to be used for maintaining competition whilst progressively reducing the number of prospective brands of equipment to a short list of at least two, for which final negotiations are to be conducted.

Whilst this list is by no means exhaustive, it does show that the EAS is a major tool in the development and management of a project. It is a dynamic document which is up-dated throughout the life of a project. It provides a focus for achieving the best overall result in terms of operational performance, cost, delivery, time scale, product support and involvement of Australian Industry. It is tailored to optimize the results obtainable from competative situations, sole source and Government-to-Government procurements, for example, Foreign Military Sales (FMS) procedures with the U.S. Government.

(2) The Project Management and Acquisition Plan (PMAP). The Project Director, on approval of the EAS, prepares the more detailed and comprehensive Project Management and Acquisition Plan (PMAP). It identifies and documents in quite specific detail a number of aspects of the project, with emphasis on the contract implementation and surveillance stages of the project. Such aspects are:

- statements of internal departmental management arrangements and the allocation of the responsibility, authority and accountability for the achievement of allocated project tasks;
- a complete listing of tasks required to bring the equipment into full operational service;
- statements covering all aspects of Australian Industry Participation;
- production and delivery schedules for prime and support equipment;

- funding and expenditure plans for all aspects of the project;
- major milestones and review points; and
- administrative and reporting procedures of the day-to-day control of the project.

As with the EAS, certain aspects of the PMAP may not be specified and documented completely at first, but only as the project develops. It is important, however, to establish at the outset the particular tasks and management arrangements and appropriate responsibilities.

The EAS and PMAP are planning documents incorporated into an executive document, the Naval Project Directive (NPD) which gives instruction and direction to implement the project.

4. Summary

This section has described the procedures in the Royal Australian Navy for the acquisition of major new equipments. Ships are considered major new equipments, but obviously form very complicated projects. The procedures are laid down in Defence Instruction (General) ADMIN 05-1, 05-2, 05-3, and 05-4, supplemented by ABR 5069, RAN Project Management Manual. The procedures emphasise the need for approval at various stages of a project and identify the necessary approval processes.

c. THE USN SHIP ACQUISITION PROCESS

1. Introduction

The U.S. Department of Defense has defined a major system as one where: [Ref. 28 and 29]

- there is a development risk, urgency of need, or is of interest to the Secretary of Defense;
- there is a requirement for joint acquisition between Department of Defense components, or between nations;
- the anticipated cost of research, development, test and evaluation, (RDT&E) exceeds $100 million; or the production costs are expected to exceed $500 million; and
- there are particular circumstances related to the manpower requirements, follow on support, or Congressional interest.

The acquisition process for such systems is based on the requirements of OMB Circular A-109, which DoD has implemented via directives 5000.1 and 5000.2. The principal change from previous directives is the addition of "milestone zero" as a Secretary of Defense decision to initiate a program, in conformance with OMB circular A-109.

This section will describe the acquisition process, a simplified form of which is depicted in Figure 9. This process may be divided into five distinct stages, namely:

- determination of mission needs;
- alternative concept exploration;
- demonstration and validation;
- full scale engineering developments; and
- production and use of the system.

After the description of the process, an organisational view is presented to show how the process is managed, and some of the documentation which is used by the Ship Acquisition Project Manager.

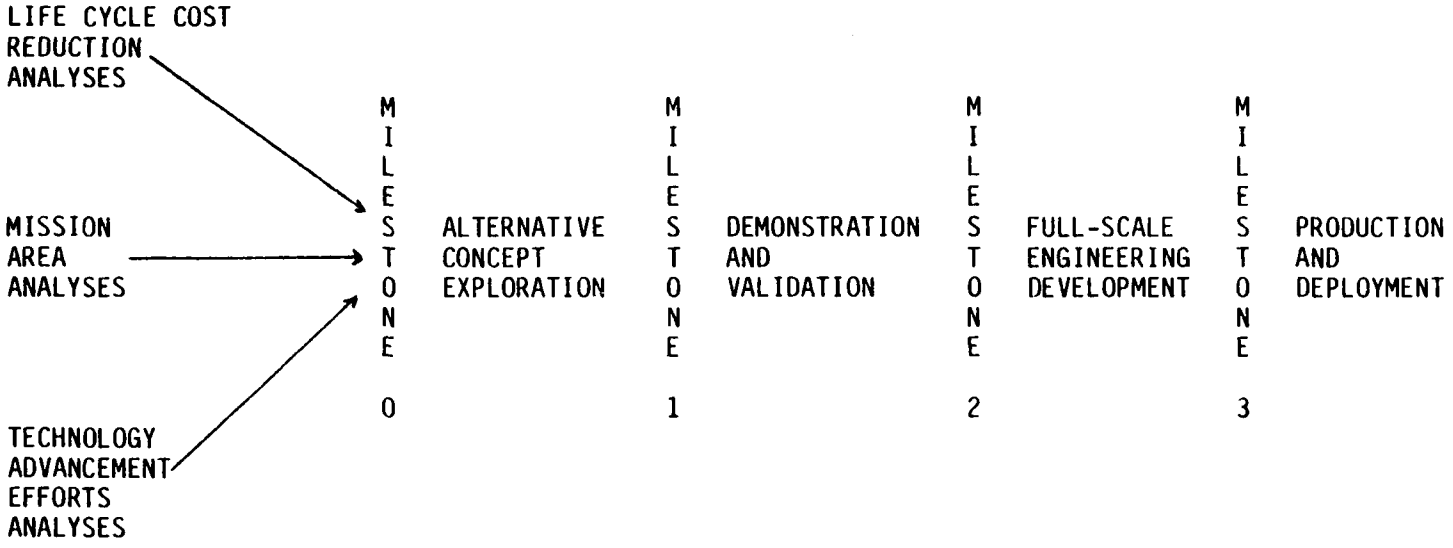

Figure 9. U.S. DEPARTMENT OF DEFENSE MAJOR SYSTEMS ACQUISITION

Much of the descriptions that follow have been developed using OMB Circular A-109, [Ref. 23] the Naval Ship Procurement Process Study, [Ref. 26] the Ship Acquisition Reef Points, [Ref. 22] and relevant Defense Instructions. [Ref. 28 and 29]

2. The Process

a. Determination of Mission Needs

The initial step in determining the needs of a new major equipment is the consideration of national objectives and policies, with due cognizance of the economic conditions, social attitudes and available technology. [(Ref. 22] The National Security Council (NSC) is responsible for developing the national security policy which is published in the Presidential Review Memoranda (PRM). On approval by the President, those documents become Presidential Decision Memoranda (PDM), which, with intelligence estimates provided by the Defense Intelligence Agency (DIA), are used by the Joint Chiefs of Staff (JCS) to formulate strategies, both short term (up to 10 years) and long term (up to 20 years). The U.S. Navy uses these studies to develop the roles and contributions required of the Navy for the national defense.

Where the existing or projected capability of the Navy is deficient in meeting the strategic guidelines, needs are established for new systems to meet the mission requirements. The Navy proposes the "Mission Element Need Statement" (MENS) to recommend the initiation of a new major system acquisition programme.

This document is submitted for review by the Defense Acquisition Executive (DAE), and the Offices of the Joint Chiefs of Staff and the Secretary of Defense (OJCS and OSD). After this review,

recommendations are made to the Secretary of Defense (SECDEF) for approval of the MENS. This approval, the Secretary of Defense Decision Memorandum (SDDM), is the Milestone Zero decision point, and allows the Navy to proceed into the next phase, Concept Exploration.

b. Concept Exploration

Following approval of the MENS and authorisation to proceed, the acquisition cycle moves into the Concept Exploration phase, which includes the solicitation, evaluation and competitive exploration of alternative system concepts. The Program Manager is appointed at the start of this phase.

The first step in this phase is an in-depth expansion of the mission feasibility studies, that may have been initiated prior to milestone zero, to establish and define criteria for synthesising alternative system concepts.

The second step is the commencement of preliminary studies exploring the alternative systems concepts. This is the responsibility of the Navy and includes the investigation of the system cost and effectiveness of the alternative candidate approaches. The solicitation for proposed solutions is in terms of mission needs and not explicit system characteristics, and provides complete information including the mission task, the operating environment, and the threat. Each approach is analysed, evaluated and optimised in order to present the recommended alternatives or alternative for the Milestone 1 decision at the end of this phase. Adequate competition is desirable to avoid premature commitments to solutions that may prove costly or are marginally effective.

The third and last step in this phase is the development of the Decision Coordinating Paper (DCP) and the Integrated Program Summary (IPS), which detail the recommended approach with respect to cost, schedule and technical risk. These documents are forwarded through the Department of the Navy Systems Acquisition Review Council (DNSARC) to the Defense Systems Acquisition Review Council (DSARC) for review. Appropriate recommendations are then made to SECDEF for approval.

Approval of the programme by SECDEF, via the SDDM, at Milestone 1 allows the acquisition process to continue into the Demonstration and Validation Phase.

c. Demonstration and Validation

During the Demonstration and Validation Phase, the selected alternatives are refined through extensive study and analysis. Advanced development models (prototypes) are developed to meet the operational requirements. The prototypes are tested and evaluated, usually by the contractor and the Navy, to assess the performance and availability of the high risk parts of the system and to reduce the development risk.

Competition is actively encouraged and prototypes may be developed simultaneously by two or more contractors. These prototypes and other experimental models are used to demonstrate that the required performance capability can be achieved, while reducing the technical uncertainty. Prototypes for ships are not required. The DCP and IPS are again prepared for review by the DSARC at Milestone 2, and subsequent approval by the SECDEF allows the programme to move into the Full Scale Development Phase.

d. Full Scale Development

The Full Scale Development Phase includes refining the prototype for production and may also include a limited production run for operational test and evaluation.

The main activities conducted during this phase are as follows:

- the threat and need assessment are re-evaluated and updated;
- the systems or equipments and other principle items for production and future support are designed, fabricated, tested and evaluated;
- preproduction prototypes are fabricated with the documentation necessary to enter the following phase of full scale production;
- development and operational test and evaluation of the preproduction prototypes are performed to determine whether the product meets its specifications and what changes would be required for the production phase;
- long lead items are finalised and orders placed if necessary to meet the production schedule; and
- the detailed concepts and methods of operations, maintenance, training, facilities, logistics, publications, manpower and support equipment are refined and documented.

At the end of this phase (Milestone 3), the DCP and IPS are again updated and submitted to DSARC. The DSARC III reviews and recommends approval of the system, determining whether or not to proceed into the

last phase of the acquisition process of a major system, the Production and Deployment Phase.

e. Production and Deployment

The Production and Deployment Phase can logically be split into two separate activities, with an overlapping of each. The Production activity starts with the approval to proceed at Milestone 3 and continues until the last system is delivered and accepted. The Deployment activity begins with the acceptance of the first operational system and continues until the system is phased out of the inventory.

3. Managing the Process for Ship Projects

a. Developing the Five-Year Shipbuilding Plan

The U.S. Navy shipbuilding programme is extremely complex resulting in the acquisition of a wide variety of ships ranging from huge nuclear aircraft carriers and complex submarines to small auxiliary and patrol craft, [Ref. 26: 3]. The building block for this programme is the Five-Year Shipbuilding Plan, the Navy's request to Congress (as approved by SECDEF and the President) for the ships believed necessary to accomplish assigned missions. This five year programme is up-dated annually as part of the budget submission by the President. It includes a breakdown of the number of ships by type and a cost estimate for the total package including all government furnished equipment (GFE). The shipbuilding plan is developed by consideration of the size and mix of the ships deemed necessary, the funding requirements and the ability of the shipbuilding industry to meet the programme.

b. Organisation for Ship Acquisition

The actual acquisition begins on approval by the Congress of the Five-Year Shipbuilding Program. Several Navy organisations become involved, but the major responsibility is assigned to the Naval Sea Systems Command (NAVSEA). A Ship Acquisition Project Manager (SHAPM) is assigned at Milestone 0, and has the responsibility for providing fleet-worthy ships to the operating forces or designated recipients, fully supported and according to the requirements and schedules as expressed by the Chief of Naval Operations. [Ref. 22: 90] A project office is set up, the structure and composition of which is dependent on the particular project. NAVSEA usually employs a small workforce coordinating and managing the efforts of larger functional organisations that affect the project.

Such functions as risk analysis, configuration management, integrated logistic support (ILS), plans and change management are the responsibility of the SHAPM. The SHAPM, through a system of Ship Project Directives (SPDs), directs and controls the actions of various functional organisations in providing necessary inputs to the project. A major area in this regard is the provisioning of Government Furnished Equipment (GFE) and Government Furnished Information (GFI). A warship is an integration of many systems, some of which are developed concurrently with the ship design. Thus, there is a need for the project managers for these component systems to continuously keep the SHAPM informed on aspects that will affect this programme. SPDs form a "contractual" document between the SHAPMs and the participating managers (PARMs).

All contracts negotiated and awarded for the shipbuilding project are handled by a Procurement Contracting Officer (PCO). The PCO is normally organisationally apart from the SHAPM, but he retains contract autonomy, while the SHAPM controls the funding. The administration of the contracts is the responsibility of the Supervisor of Shipbuilding (SUPSHIPS).

c. Project Management Documentation

The most important project documentation prepared by the SHAPM is the Ship Acquisition Plan (SHAP) Outline. This document reflects all the data on the project known to date and lays down the dates for all SPDs to be issued to support the project. As the program proceeds, the outline is refined continuously and the SHAP itself is developed which details the plan and strategy to be followed throughout the acquisition process. It reflects the management concept for directing and controling all the elements of the acquisition to meet the goals and objectives of the programme. The strategy is developed during the Concept Development Phase and covers such areas as competitive procurement, during this phase and future phases. This document evolves through an iterative process and becomes increasingly definitive as the programme advances. It is not a document requiring approval by any other authority, but it forms the basis of other documents such as the DCP/IPS.

Other documents of note are the Top Level Requirement (TLR) and the Top Level Specification (TLS). The former defines the operational requirements of the ship to be produced, stipulates the maximum cost and identifies all other constraints affecting the project. The TLS translates the TLR into a description of the ship and provides

a bridge between the TLR and the contract specifications that will be developed for the procurement of the ship.

4. Summary

This section has described the U.S. Navy procedures to be followed for the acquisition of major systems. These procedures are based on the requirements of OMB Circular A-109, which have been incorporated into DODD 5000.1 and DODI 5000.2 to reflect the specific needs and policies of the Department of Defense. The directives emphasise the establishment of a project office and the concept of decision milestone points during the process of the acquisition. The project manager is appointed early in the process and he develops certain documents enabling him to control, direct and monitor the progress of acquisition.

D. COMPARING THE RAN AND USN PROCEDURES

This section will compare and comment on the procedures of the RAN and USN Ship Acquisition Procedures. Figures 10a through 10d show a side by side pictorial presentation of both countries' procedures for each major phase of the process. These figures do not show the internal endorsement and approval processes by the respective navies necessary before consideration by the respective defence departments.

An examination of the flow diagrams shows that the procedures have sequential steps with sufficient feedback loops for the re-examination of the requirements where necessary. It is considered that the procedures as they stand are satisfactory.

The topics addressed in the documents forwarded to the decision makers in both countries are also comparable. The prime document in the RAN is the Major Equipment Submission -- Form DP1; the prime documents

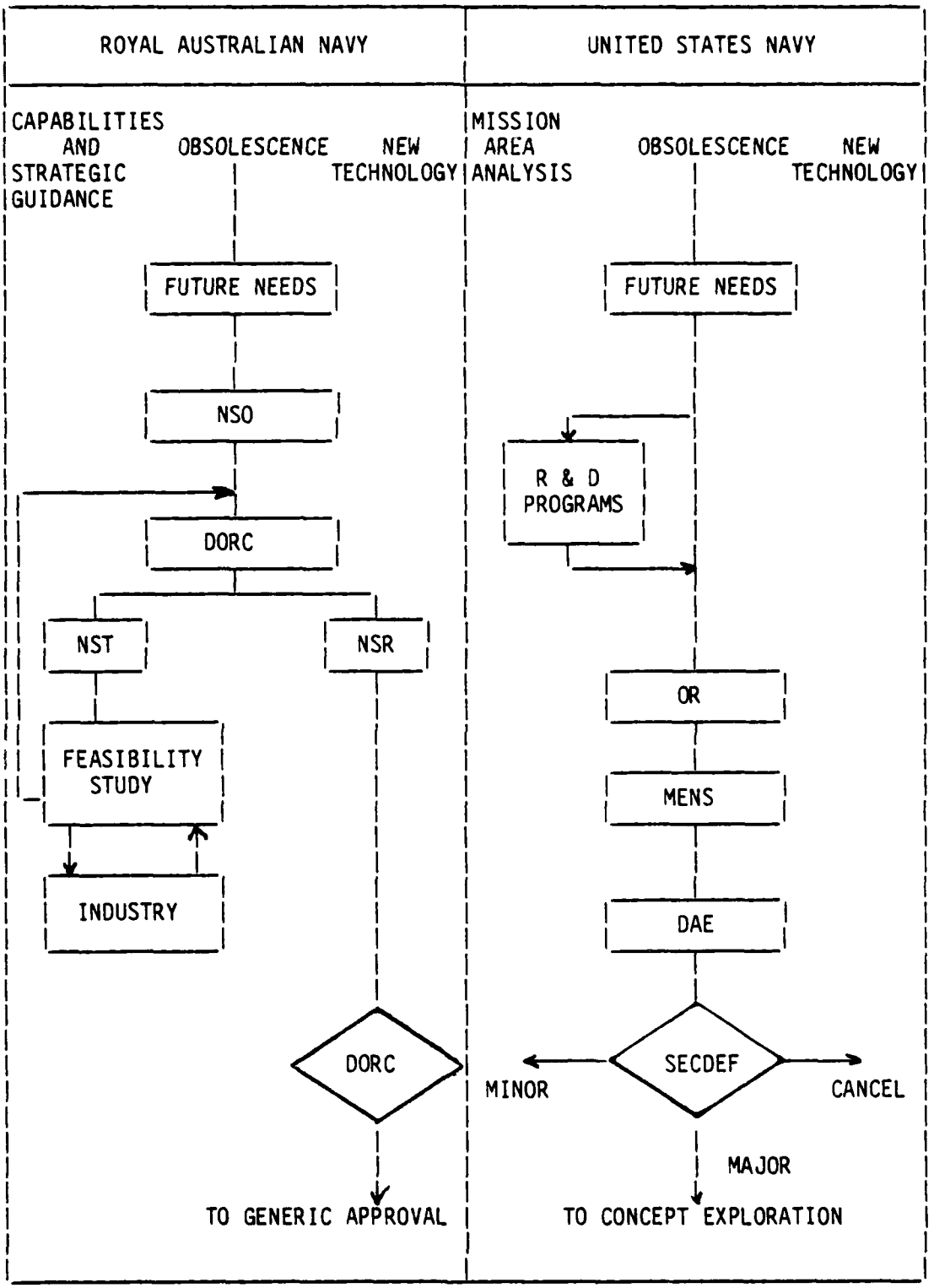

Figure 10a. IDENTIFYING NEEDS

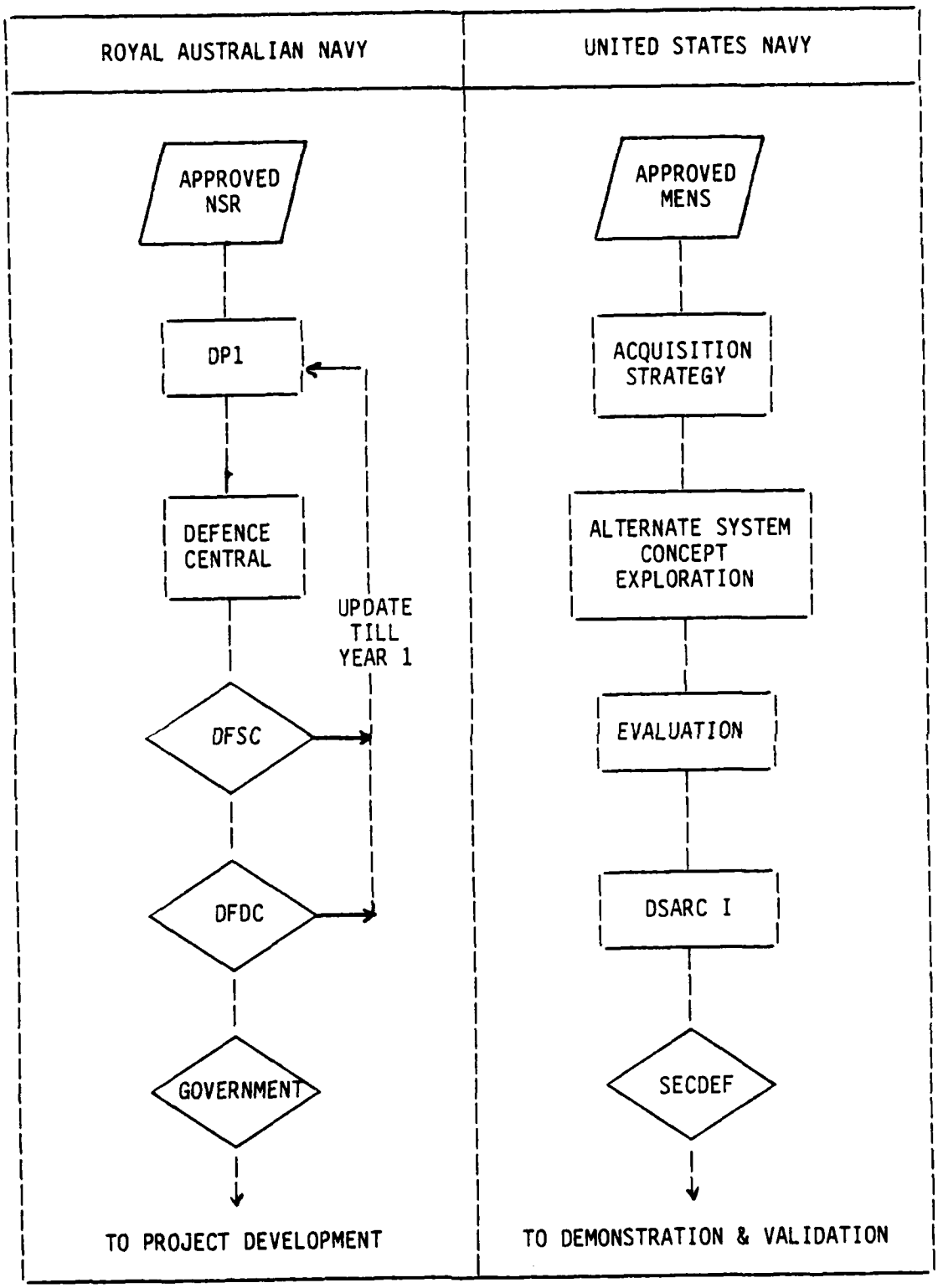

Figure 10b. GENERIC APPROVAL/CONCEPT EXPLORATION

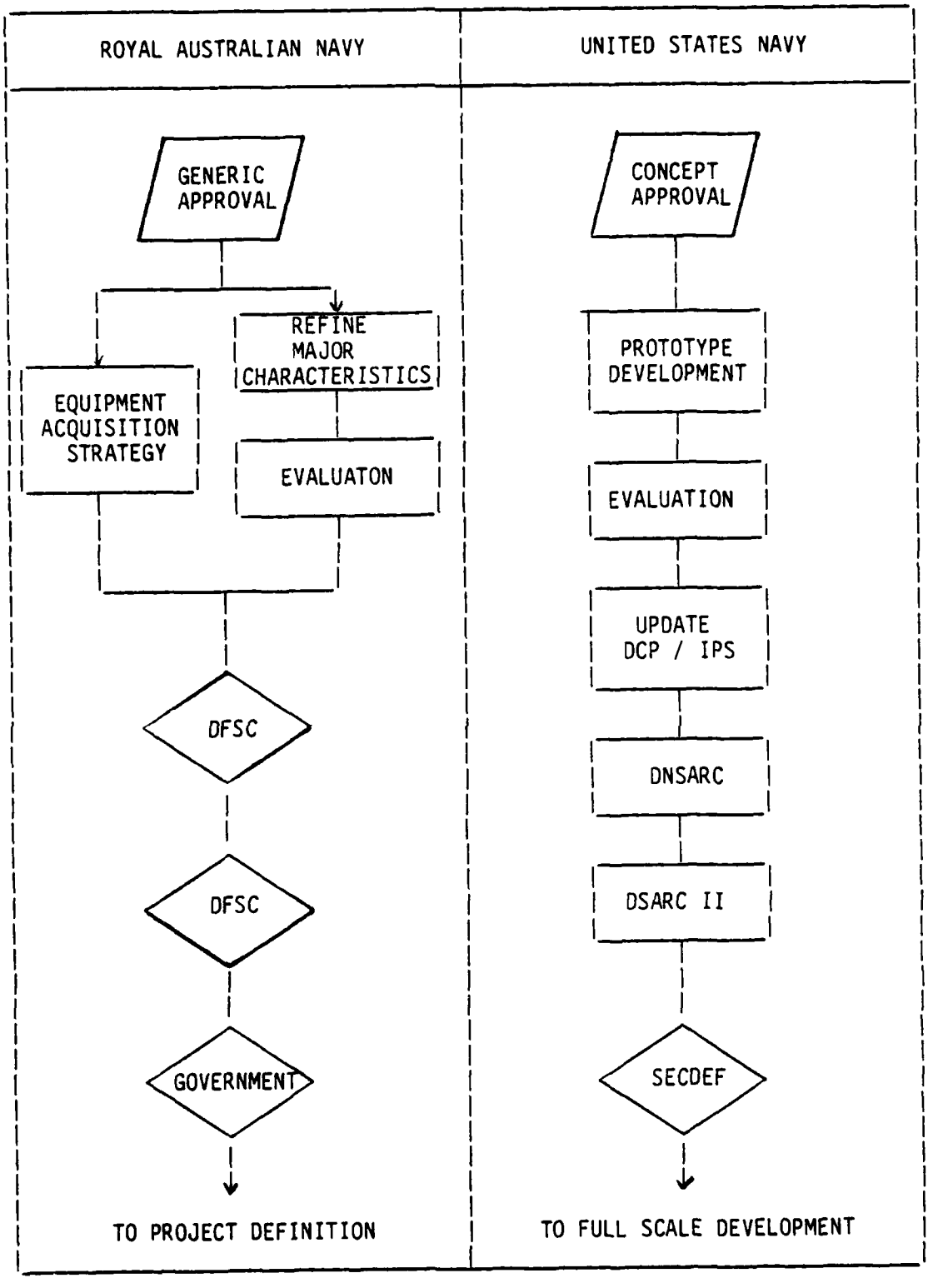

Figure 10C. PROJECT DEVELOPMENT/DEMONSTRATION AND VALIDATION

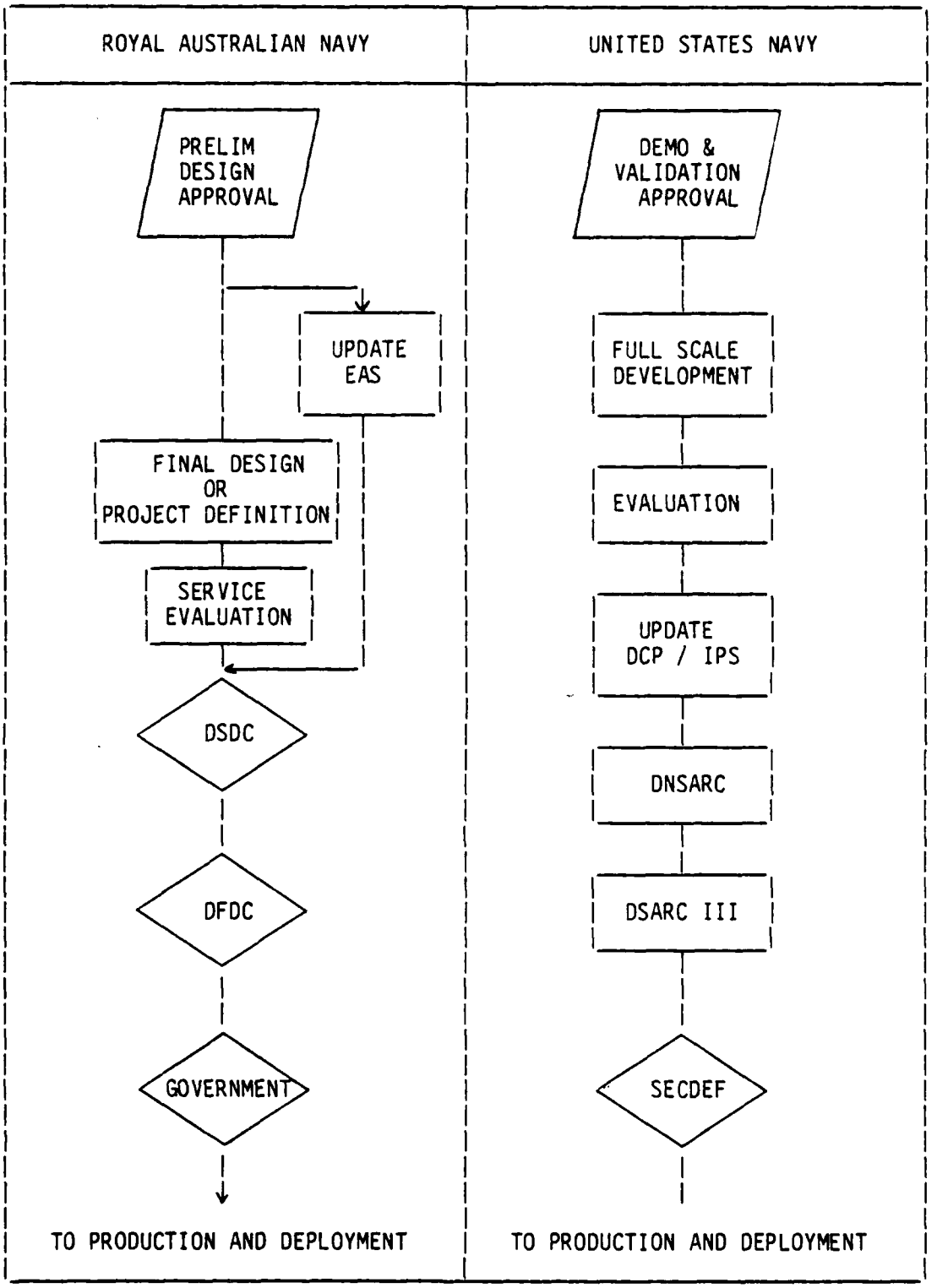

Figure 10d. PROJECT DEFINITION/FULL SCALE DEVELOPMENT

in the USN being the Decision coordinating Paper (DCP) and Integrated Program Summary (IPS).

There is, however, a general feeling, evident by the many studies and papers written, that there are problems with the procurement process. If it is accepted that the procedural steps in figure 10 are satisfactory and flow logically from one endorsement or approval to another, the problems must be within the organisations involved in the process.

For the RAN, the Bruce Working Party reported that many delays were occurring due to the organisation of Naval procurement which was not sufficiently unified. Consequently, the responsibility and accountability for procurement actions were ill-defined, and communication between branches difficult. [Ref. 31: paragraphs 73-77] The Working Party proposed an outline structure for a Naval Procurement Division within which would be commodity procurement cells, a major project cell and control cells for financial and management systems. In the USN, these functions are all within the Naval Material Command, and even appear in the individual systems commands. The proposed structure, under the leadership of the Chief of Naval Procurement, would significantly reduce the continual debate of contentious points of a proposal between numerous directorates when these contentious points do not significantly alter the total content of the proposal. Dedicated procurement officers would gain experience in this field, which currently is staffed by many non-specialists. The NAVPRO Working Party examined the Bruce proposal in greater depth and proposed three options for the reorganisation of the present technical and materiel divisions to improve the project administration and project activities. [Ref. 25: Chapter 7]

An opinion as to which option would be most appropriate is outside the capabilities of this author. However, it is felt that although there is a need to have the responsibility and accountability delegated to the lowest level possible, the organisation within the RAN should be considered in the light of the other Australian services and the Department of Defence as a whole.

Common organisational structures and procedures within all defence factions would enable conformity in approach, considered necessary for a country like Australia. The training of procurement personnel and their subsequent experience along common lines would strengthen the expertise in the acquisition of defence equipments. Australian industries would find it easier in their dealings with the Services and the Defence Department.

E. SUMMARY

This chapter has described the processes used in the procurement of major systems by both the RAN and the USN. A comparison has shown that the procedures are almost identical.

However, there is evidence that there are several problems which cause delays in the processes, and it is considered that these problems lie not in the procedures, but the management of the procedures within the navies. A unified Naval Procurement Directorate has been proposed for the RAN by the Bruce and Naval Procurement Working Parties. Further study into this area is recommended, however, for a small country such as Australia; each of the Services and the Defence Department should be organised along similar lines for procurement activities.

IV. GFE AND STANDARDISATION CONSIDERATIONS

A. GENERAL

Government Furnished Equipment (GFE) is that equipment supplied to a contractor for subsequent use in the manufacturing of, or incorporating in, the item being procured. The technical information describing such equipment or information provided in suport of the production, such as specifications and standards, is called Government Furnished Information (GFI). Collectively, the above items are known as Government Furnished Materials (GFM). Items procured by the contractor for use in production are known as Contractor Furnished Equipment (CFE).

The U.S. Defense Acquisition Regulations (DAR), suggest that the use of Government Furnished Equipment be restricted. DAR 13-201 says:

> "It is the general policy of the Department of Defense that Contractors will furnish all material required for the performance of government contracts. However, the Government should furnish material to a contractor when it is determined to be in the best interest of the government by reason of economy, standardization, the expediting of production, or other appropriate circumstances."

This researcher knows of no equivalent Australian policy statement.

Items of equipment are generally designated as GFM for ship construction projects when it is considered to be in the best interest of the government to do so. This usually occurs under one or more of the following conditions: [Ref. 24: 7]

- the production lead time of the equipment is so lengthy that the procurement action for it must commence before the shipbuilding contract is let;

- the material to be supplied is still in the development stage and will be produced concurrently with the shipbuilding programme, and hence definitive specifications cannot be provided and the large attendent element of risk would be inappropriate for the shipbuilder to bear;
- a requirement exists to standardise with other equipments already in service, or already being procured under other contracts, and cost savings would occur through quantity procurement;
- the equipment is already stocked in the supply system, and its provision to the shipbuilder will not require subsequent special reprovisioning (commonly called "in long supply"); and
- the items are standard stock items of a portable nature which will constitute the outfit supply.

The selection of which items are to be designated GFE must also consider the requirement for standardisation, commonality and interoperability with allied nations.

When a ship is built in a Naval dockyard, all equipment and material is effectively furnished by the government and must then be procured in accordance with the purchasing policy of that government. In Australia, a distinction is then made by designating the equipment as either Naval Board Supply Items (NBSI) or Shipbuilder Supply Items (SBSI). When a ship is built in a commercial dockyard, the procurement of contractor furnished equipment and material is largely carried out in accordance with the shipbuilder's own procurement policy. In the U.S., the purchasing policy of a contractor is reviewed to determine that it is efficient and effective in the expenditure of government funds. It has recently

been demonstrated in Australia that a commercial shipbuilding firm was able to procure items of CFE in 16 to 44 weeks, with an average of 35 weeks. Similar items procured by the Navy took between 46 to 130 weeks, averaging 77 weeks, from the placement of the orders to receipt. [Ref. 31: paragraph 18]

This chapter will discuss the problems associated with particular GFE and highlight some possible solutions to these problems. The requirement for GFE and CFE to have some level of standardisation is also discussed.

B. PROBLEMS

The shipbuilding programme management office is usually based on a matrix organisation with the functional areas procuring and controling the GFE. Whilst this makes possible greater specialisation with less technical duplication, proper coordination is necessary to ensure adequate cost, schedule and performance control. [Ref. 24: 13]

When the Government undertakes to furnish material to contractors, it becomes contractually obligated to ensure that the material is delivered in time, is properly identified, is suitable for its intended use, and that it conforms to the specifications for the total system. Additionally, there are significant cost implications in the management of GFE.

1. Timing

The timing of the delivery of GFM to a contractor is very important: late deliveries cause delays and disruptions, early deliveries affect storage and warranty conditions.

The shipbuilders' construction schedules and delivery dates can be disturbed by late supply of equipment or information. The work, either in planning or actual construction, in a particular area, or a related area, could be severly disrupted if the right material is not available. To rearrange the schedule may not be fully possible especially when the activities involve several disciplines. Inevitably, the final delivery date must be delayed, and the costs rise.

Early delivery of equipment to the shipbuilder makes it necessary for him to store the equipment until installation is possible. Consequently, this equipment could be subjected to degradation due to environmental conditions, pilferage or cannibalisation for preceding ships. The contractor may have to establish some type of preventative maintenance programme for the equipment, and provide adequate security during the storage period. The Government may have a warranty of this equipment but cannot exercise the conditions on the warranty if a receipt testing is not possible within a certain period, and the warranty could expire prior to the installation and initial testing. If the shipbuilder does not, or cannot, accept responsibility for the equipment prior to the due date because of space or manpower implications, the Government would have to provide the appropriate facilities.

2. Specifications

The adequacy of the specifications supplied to a shipbuilder is extremely important. Defective or incomplete specifications have to be amended prior to all preparations for installing items of equipment. If the equipment is installed and then a fault is discovered with the specifications, alterations or deletions to the work are usually required

with the resultant effect on the delivery schedule and cost. The specifications could originate from the Navy, another contractor, or from the lead-yard in a major shipbuilding programme.

3. Identification

The proper identification of material impacts on the shipbuilders' planning and control. The contract documents, drawings, specifications and equipments must be clearly identified, and the method of identification consistent between related documents and equipment.

Confusion inevitably arises when the contract quotes another document which is subsequently amended, or the identification is altered. Areas of concern are drawings which are supplied by a third party, but subsequently endorsed by the Navy with another identification number. The equipment is then delivered with another series of identification markings. Cross verification of these different markings impacts on the delivery schedule and configuration management.

One major problem encountered by Todd Pacific Dockyard Seattle, and the Superintendent of Shipbuilding Conversion and Repair, Seattle in the FFG programme, is the identification of GFM at delivery to the shipbuilder. The only formal documentation identifying GFM is the "Schedule A" listing the GFM to be provided to the contractor for the performance of the contract. [Ref. 21: 405] This listing, however, identifies major items only and is inadequate for use as a means of identifying all items of equipments received. The FFG Program Office (PMS 399) has provided to SUPSHIPS a further breakdown of Schedule A to part numbers of major sub-assemblies. This, however, is still inadequate. The packing list accompanying the equipment is sometimes incomplete so an adequate check

is not possible using this. The warehouseman at Todd uses the packing list for the first delivered of each equipment as his baseline. This may be acceptable for a competent warehouseman in a lengthy programme, but is insufficient for a one-of-a-kind situation.

C. SOLUTIONS

The management of GFM within the two Navies is similar in that the matrix organisation concept is followed and there are documents issued to ensure that the appropriate functional areas are identified and the appropriate responsibility assigned for the procurement of GFE. The RAN uses the Equipment Acquisition Strategy (EAS) document incorporated into the Naval Project Directive (NPD); the USN uses Ship Project Directives (SPD). The NPD is an executive document which directs authorities to take action, whilst the SPD represents an agreement between the Ship Acquisition Program Manager (SHAPM) and the Participating Manager (PARM), and is signed by both parties. The type of information contained in each is similar, the major difference being that NPD encompasses the total project, whereas the SPD addresses only those goods or services under the cognizance of a particular PARM. Several SPD's with a number of PARM's are necessary for each ship construction project.

Considering the relative sizes of the two navies, each type of document is probably appropriate for the prevailing conditions.

All of the problems discussed in the previous section lead to slippages in the delivery schedule and increased cost. In the USA, shipbuilders have filed substantial claims resulting from GFM-associated problems against the government. In Australia, these same problems have

resulted in large cost overruns and late deliveries for ships either being built or refitted in Navy operated dockyards.

The early selection of GFM and in particular GFE, or the selection of GFE items that are currently in production would solve many of the late delivery problems encountered.

A cut-off date for the designation of an item for each ship should be established such that any equipment changes or modifications made after that date would not be incorporatd. The configuration of the equipment would be firm and could be validated to ensure that the correct specifications were available to the shipbuilder. A disadvantage, however, to this approach is that a possible technological breakthrough would not be incorporated resulting in inferior equipment, when a relatively small delay would have given an enhanced capability for the operational life of, say, the weapons system.

Firm specifications and configurations would also enable identification problems to be solved. A constant effort throughout the programme would be necessary to ensure that all the project documentation is compatible and cross referencing thus made easier. The identification of delivered items could be enhanced with an expanded Schedule A format to major component level. A possible tool for this is the RAN's Equipment Breakdown and Support Assessment List (EBASAL). The EBASAL is designed to facilitate the ordering of support spares and special-to-type tools and test equipment. It is completed by the contractor and identifies the parent equipment, each main assembly, each significant subassembly, and any special-to-type tools and test equipment. The component items relevant to each main assembly are also listed. If this document was

made available to the shipbuilder, he would have a comprehensive listing of deliverable GFE items.

For the Guided Missile Frigate (FFG-7) shipbuilding programme, the USN has made extensive use of a Land Base Test Site for combat systems equipment. Such equipment (radars, sonars, launchers, guns and fire control systems), are generally always GFE. The original purpose of the Land Based Test Site was to install and integrate live equipments in simulated shipboard compartments and to develop the computer programs to render the entire system operable early in the ship design process. [Ref. 24] It has also acted as a staging and testing ground for GFE prior to shipping these equipments to the shipyards. Each equipment is inspected and tested individually, and then as a total system. Hence the Government could exercise the warranty provisions in sufficient time, and hold the equipments until the required shipment date. At this time, a procedure could be developed to relieve the identification problems at the shipyard.

With the size of Australia's shipbuilding programme, the luxury of a Land Based Test Site is not affordable. For the RAN FFG's built in the USA, the facility can be used; however, for ships built in Australia, with the possibility of equipments from several different countries, its use is denied. An alternative would be for the equipment to be set up ashore in the dockyard prior to installation. The limitations of this approach, however, are that the total system could not be integrated, and an operational check-out impossible. It may, however, be a step in the right direction, given sufficient numbers of each equipment in service.

D. STANDARDISATION, COMMONALITY AND INTEROPERABILITY

In selecting equipment to be fitted in a ship, cognizance of the of the requirements for standardisation, commonality and interoperability with allied nations is necessary. The USA is currently engaged in several studies and projects related to NATO Rationalisation, Standardisation and Interoperability (RSI). These are broad terms and thus require defining prior to discussion on their applicability to the RAN requirements:

1. Rationalisation

> "Any action that increases the effectiveness of Allied Forces through more efficient or effective use of defense resources committed to the Alliance needs, standardisation, specialization, mutual support, improved interoperability or greater cooperation." [Ref. 27]

This is a broad definition forming the basis of policies towards standardisation. It says, in effect, that each Allied nation in enhancing their own military effectiveness should consider the needs of the other nations.

2. Standardisation

> "The process by which member nations achieve the closest practicable cooperation among forces; the most efficient use of research, development and production resources; and agree to adopt on the broadest possible basis the use of (a) common or compatible operational, administrative, and logistic procedures; (b) common or compatible technical procedures and criteria; (c) common compatible or interchangeable supplies, compontents, weapons, or equipment; and (d) common or compatible tactical doctrine with corresponding organizational compatibility." [Ref. 27]

This definition is again very broad, and does not specify the degree to which systems should be "alike," but does state that "alikeness" is desirable.

3. Interoperability

> "The ability of systems, units, or forces to provide services to and accept services from other systems, units or forces and to use the services so exchanged to enable them to operate effectively together." [Ref. 27]

Interoperability is an attempt for different systems, although not necessarily "standardised," to work together.

4. Commonality

> "A quality which applies to material or systems possessing like and interchangeable characteristics enabling each to be utilized or operated and maintained by personnel trained on the others without additional specialized training; and/or having interchangeable repair parts and/or components; and applying to consummable items interchangeably equivalent without adjustment." [Ref. 27]

There are two sides to this definition: one being that equipments should have no significant external differences, and the other that internal composition should be as identical as possible.

From the above definitions, it can be seen that effectively "commonality" is a subset of "interoperability" which in turn is a subset of "standardisation." To meet a given operational requirement, it is certainly beneficial to have a standard system, design, logistics and operating procedures; logistic items (spare parts, modules, etc.) that can be utilized in many systems become common items.

Standardisation has many benefits, the major ones being: the reduction in life cycle costs, the reduction in spare parts to be purchased and stocked, the simplification of test equipment requirements and testing procedures, the reduction in training requirements, and the improvement of reliability, maintainability and availability. However, on the other hand, there are disadvantages of standardisation, some

being: ideals cannot be realised, limitation of design flexibility, more parameters become fixed, expensive subassemblies become more populous and voluminous, and greater susceptibility to obsolescence. [Ref. 20: Chapter 14]

The advantages and disadvantages clearly have to be weighed against each other to determine the level of standardisation required: intra-ship, intra-class, intra-Navy, inter-service, or inter-nation. The decision on the degree of standardisation and methods to achieve the required level of standardisation should be made early in, and continually reviewed during, the acquisition cycle.

As Australia buys most major weapons systems from other countries, in particular the USA, a large degree of interoperability occurs naturally. However, the RAN is a small navy, with three or four major classes of destroyers and frigate-size ships, and there is little commonality between classes, and, in some cases, within a particular class. An improvement in the degree of standardisation would be beneficial.

E. SUMMARY

This chapter has described the problems associated with government furnished equipment supplied to a shipbuilder. The problems occur in the areas of timing, specifications, and identification, which all lead to slippages in the delivery schedule and increased cost of the shipbuilding programme.

Early selection of GFE would solve most of the problems with the attendent risk that the latest available technology may not be incorporated. A balance between the technology and cost and delivery must therefore be adopted.

The requirements for standardisation, commonality and interoperability with allied nations has been discussed and some advantages and disadvantages highlighted. No firm guidelines have been proposed as it is considered that the requirements for each project must be considered individually. However, for a small navy, standardisation between the ships would reduce costs in training, spares support and would simplify the management aspects of equipment. It would mean, however, that advances in technology would not be incorporated rapidly with the consequent feeling of being "out-of-date."

V. A PROPOSAL FOR THE RAN

A. INTRODUCTION

Existing requirements and procedures for ship construction projects in the Royal Australian Navy are not particularly well defined, and a need is seen to improve the situation from the determination of the requirements through to the operational use and subsequent retirement of a ship. This chapter will develop a proposal for the complete life cycle; however, some of the ideas could very well be used for a particular phase, without having the whole proposal accepted.

B. THE PROPOSAL

The Royal Australian Navy normally operates with approximately twelve front line operational warships of the destroyer/frigate size. If the average life of such a warship is 24 to 30 years, Australia should on the average be procuring warships at the rate of one every two to two-and-a-half years. It is suggested that Australia embark upon a programme which will produce ships at this rate.

By embarking on a cyclical replacement programme for warships, the "replacement syndrome" in lieu of mission needs is not being promoted. Australia, being a large island nation dependent on trade, will always need some form of defence at sea. The basic platform requirements, such as displacement, range and speed, do not alter significantly over time frames up to 30 years, allowing a common platform to be designed with little need for modification for 10 to 20 years, or say up to ten ships. The effectiveness of a weapons system from its initial operational

commitment varies more in relation to perceived threats than does the platform requirements; however, a commonly accepted period is 10 to 15 years, allowing five ships to be built with a common weapons system, and a further five existing ships to be updated with the same weapons system. Modifications to such a weapons system inevitably are introduced, which extend the effective period further.

The basic proposal is, therefore, to develop an on-going replacement programme to maintain the present size of the Royal Australian Navy, such that a ship is completed every two years, the requirements being continually reviewed, however, the platforms not substantially altered for ten new ships, and the weapons fit not being altered for five new ships. A diagrammatic presentation of this proposal is shown in Figure 11.

The effects on Government considerations, Defence asquisition organisations, industrial activities, equipment considerations and other aspects of this proposal are discussed in the following sections.

C. EFFECTS OF THE PROPOSAL

1. Government

This proposal is for a replacement programme only and is not a means of increasing the size of the Royal Australian Navy. As Australia's political structure is such that the govenment-of-the-day directs the activities of the Defence Forces, and the political climate such that a change of government could occur every three years, a bi-partisan agreement between the major political parties would be required for such a programme to continue. As a replacement programme alone, the idea may be easy to "sell" to both parties, leaving any requirement to increase the

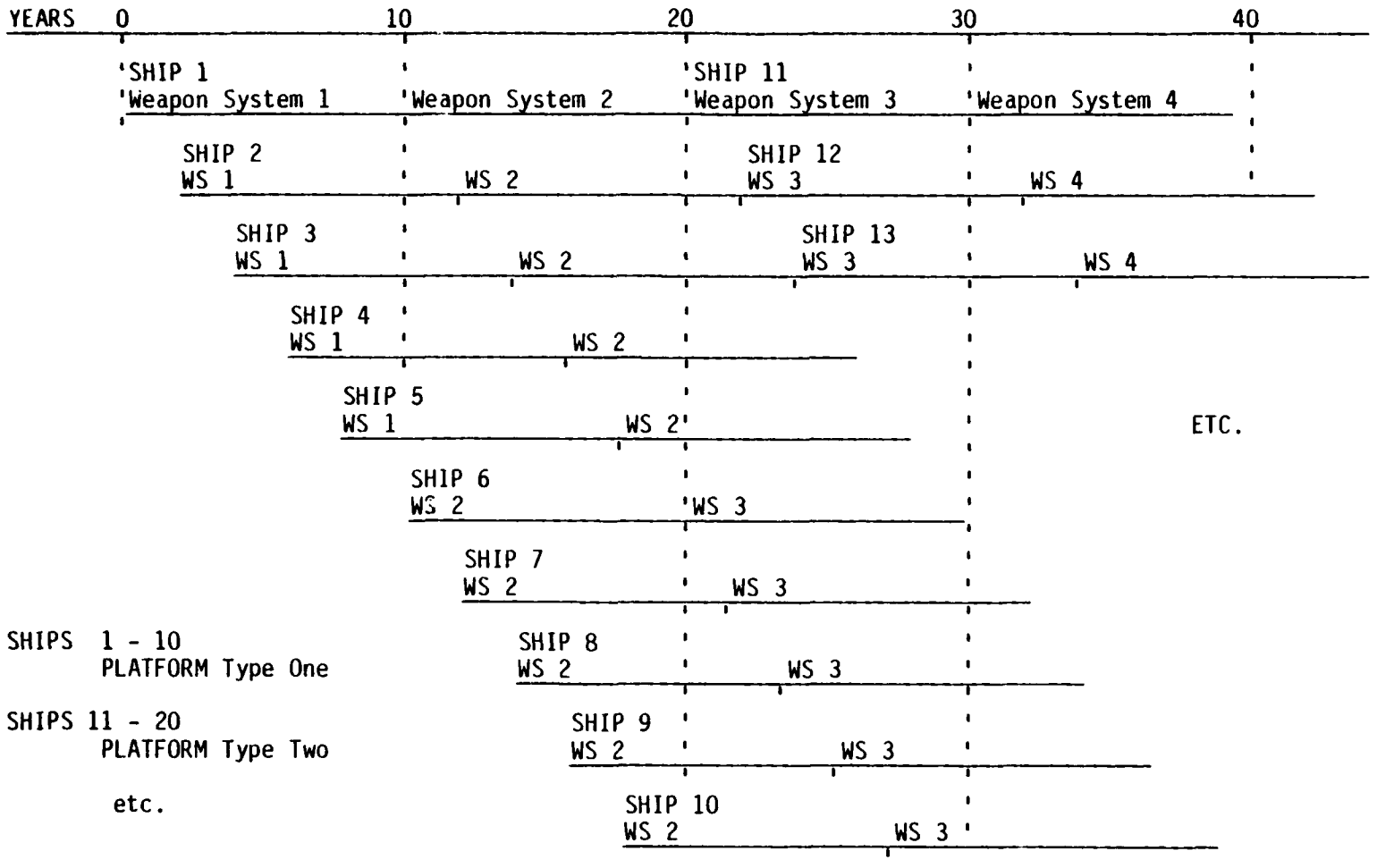

Figure 11. A PROPOSED REPLACEMENT SHIPBUILDING PROGRAMME FOR THE RAN

size of the Navy to meet changes in the strategic conditions, the responsibility of the government-of-the-day after due analysis of the threat.

2. Defence Acquisition Organisation

The present acquisition procedures within the Navy, Defence and other government organisations are cumbersome and inefficient. An established on-going programme would enable the appropriate organisations to consolidate their procedures. In particular for the Navy, a consolidated procurement organization, such as that proposed by the Bruce Working Party, would be very effective and efficient. The consolidated organisation would receive the technical specifications of the requirement and would then process the requirement through the tendering, assessment of tenders, contract preparation and award, contract administration and finally receiving the equipment/ship for handover to the user. [Ref. 31] The approval procedures leading to the various milestones would be reduced. Accountability and responsibility would be easily visible, and administrative costs would be reduced.

This type of organisation could be further consolidated if the technical aspects are also included. This approach was suggested by the Naval Procurement Working Party (NAVPRO). [Ref. 25: 7] The consequences of this change would be a departure from the matrix-type organisation to a functionally-oriented structure. However, as the ship design and selection of equipment requirements would be greatly reduced, no increase in manpower is seen as necessary.

3. Industrial Activities

It is unlikely that an overseas shipbuilder would be willing to provide ships to such a programme, and thus this programme would

require the ships to be built in Australia. The Australian shipbuilding industry would therefore have an on-going approved programme and would thus be able to plan their activities in relation to plant, equipment, manpower and management controls more effectively. The effect on the competition is difficult to determine as there is the possibility of collaboration between shipyards leading to a conglomerate and monopolistic situation, and also the possibility of other corporations seeing the requirements and endeavoring to enter the shipbuilding industry. By maintaining a Naval Dockyard for refitting ships, but with a capability of ship construction, competition should be enhanced.

Other industries, such as the electronics industry, in Australia would be motivated to enter into defence contracts if an on-going need is foreseen. The production runs would be for similar quantities of each equipment, but they would be spread over a longer period. It would not be economical to produce ten weapons systems over ten years. The possibility of overseas sales of such modular equipment should not be overlooked, allowing more units to be produced with consequent reductions in R&D and set-up costs per unit.

The stabilising effect in local industries would be felt from the design stages, through the production, to the maintenance and follow on support stages. It would affect capital equipment purchases, learning curves of designers and producers, and encourage more people of all disciplines to enter the industries.

4. Equipment Considerations

All equipment and material required for the construction of a ship would be procured more efficiently through quantity purchases,

reductions in specifications and ordering preparations, and general reductions in administrative and other delays. The selection of equipment would require a greater effort in the initial stages of such a programme, but the effort to maintain the programme will be reduced.

For the weapons systems which will be incorporated into the platform, a greater degree of modularity than exists today would be required. However, it is considered that apart from launchers, guns and magazines, most present day electronic equipment could be more modularized. Ideally, each piece of electronic equipment should be portable to allow installation inside a ship to be accomplished by carrying the item through standard doorways and hatchways and then plugging into a predetermined equipment rack. The services provided by the platform, such as electrical power, air conditioning, cooling water, and control wiring, would require sufficient contingencies built in to accommodate changes to equipment throughout the operational life of the platform. If follow on equipments, although enhanced technologically and in their capabilities, were produced in similar sizes and numbers of modules, the half-life modification of a ship would be considerably easier, and would not require major superstructure changes as experienced with the Destroyer Escorts and Daring Class Destroyers.

The construction or refitting of a ship would effectively be divided into two distinct stages: the platform and the weapons fit. These two activities need not necessarily be assigned to the same contractor; for example, the platform could be constructed or refitted in a commercial shipyard, with the weapons fit being installed by a Naval dockyard. Delays in the availability of one weapons system would not

prevent a new ship from being completed, from undergoing trials, or even from operating, albeit with a reduced capacity. It is considered that it is better to have some capability at sea, than to have no ship at all.

5. Other Considerations

As Australia does not have the technology base to develop a complete modern weapons system, it will still be necessary to obtain from overseas the equipment, or, at the least, the production information. To purchase equipments overseas to the required level of modularity may not be possible when the overseas manufacturer is producing the same equipment for several countries, and the Australian order is small in comparison to the total quantity being produced. If the other customer countries are also interested in the modularity concept, the manufacturer would undoubtedly be interested in such specifications. If not, then the design specifications could be bought by an Australian company or licensed production could be considered. The overseas manufacturer could still provide the major components, the Australian manufacturer configuring them to meet the modularisation needs.

As a greater number of the same weapons systems would eventually be procured, standardisation within the Navy would occur. The advantages of such commonality described previously would result. Additionally, if one, or even two, extra systems were procured than those required for shipboard use, a site ashore could be established with the appropriate services to give a "hot," but not necessarily fully operational, system. This system could be used for technical or operational training, fault diagnosis on equipments removed from ships during maintenance periods,

or as a ready-use spare to meet an urgent operational requirement. This shore-based equipment would not be as effective as the Land Based Test Site used in America, but it would certainly be a step towards the concept. The cost of these extra systems would be partly offset by reduced training costs, and reduced spares inventory costs.

The morale of everyone involved with Naval ships would increase. The seagoing uniformed personnel would see a continual update of the Navy as a whole; they would be better trained, less frustrated due to lack of spares and long maintenance periods, and would be more interchangeable between both ships and shore facilities. Those employed ashore in policy and procurement activities would see a result of their efforts, without fear of a project being disbanded after many years of work. Dockyard and industry personnel would have an on-going programme resulting in employment tenure.

D. SUMMARY

If an on-going proposal to replace the ships of the Royal Australian Navy was introduced, such that a new ship appeared every two years, with a common platform for ten ships, and a common weapon fit for five new and five existing platforms, many advantages would occur. The advantages would affect the procurement activities within the Navy and Defence organisations, the Australian industrial base for the production and support of defence equipment, the maintenance, operational and training requirements for the Navy, and all personnel involved with ships.

The proposal would not be easy to initiate: the cooperation of the political parties and industry would be required; the initial platform design would require considerable effort; and the redesign of weapons

systems to the modular concept and their subsequent manufacture would require considerable effort. However, once underway, the programme would be relatively simple to plan, control, coordinate and implement. It would also establish a baseline from which advanced or additional requirements could be generated.

Although the ideas expressed result from this proposal in total, they could be individually applied to existing arrangements for various aspects of ship construction projects.

VI. RECOMMENDATIONS AND CONCLUSIONS

A. SUMMARY OF THESIS

This thesis has presented the author's view of various aspects of the acquisition processes of the Royal Australian Navy and the United States Navy. The processes have been compared, and, recognising that direct comparisons between two countries of widely differing populations, government structure, defence organisations and industrial capabilities are difficult, some areas of possible improvements have been discussed.

A proposal for the RAN to embark on a replacement shipbuilding programme has been presented. This proposal is for the RAN to have built in Australia one warship of destroyer/frigate size every two years. The warship platform design would remain essentially stable for ten ships, with a modularized weapon fit suitable for half the life of the platforms, installed in five new, and five existing ships. The impacts and requirements of various aspects of such an acquisition programme have been discussed, and presented in such a way that they could be adopted individually even if the total proposal was considered unsuitable after a more detailed study.

B. CONCLUSIONS

The actual procedures for the acquisition of equipments followed by the defence departments in both Australia and the United States of America are, in general, straightforward and follow logical steps from one stage to another, with sufficient feedback loops to provide necessary checks and balances. The majority of material written about the process

in the USA tends to criticise the procedures. However, it is considered that the procedures are adequate; the problems occur in the management of these procedures.

The early selection of items which are to be furnished to the shipbuilder by the government would reduce the problems leading to delays and increased costs of the shipbuilding programme. Selecting items that are standardised with other equipments would reduce costs in training, support and management. The opposing view is that advances in technology would not be incorporated, leading to earlier obsolescence of equipments.

C. RECOMMENDATIONS

The major recommendation resulting from this research is for Australia to embark on a cyclical replacement programme for destroyer/frigate size ships. This proposal is discussed fully in Chapter V.

The procedures for major system acquisition are adequate, however, it is recommended that improvements could be made in the management of the process within each Navy. A unified procurement area within the RAN along the lines proposed by the Bruce and Naval Procurement Working Parties is recommended. The final structure of this area requires further study, but should be considered in the light of the other services and the Defence Department as a whole.

The requirements for government furnished equipment should be determined and finalised as early as practicable to reduce costs and maintain delivery dates. A balance between technology and cost and delivery must be drawn for each project alone; a firm general policy statement is inappropriate. Similar arguments exist for the extent of standardisation to be adopted. It is, however, recommended that for the RAN it is more

important to have ships at sea with adequate equipments fitted, than to have modern technology tied up in the dockyards.

APPENDIX A

COMMITTEES INVOLVED WITH ACQUISITION

1. AUSTRALIA

Consultative Group

Chairman:	Deputy Secretary B (or other appropriate Deputy Secretary)
Members:	Deputy Secretary A Deputy Secretary C Assistant Chief of Defence Force Staff Deputy Chief of Naval Staff Deputy Chief of General Staff Deputy Chief of Air Staff Executive Controller, Australian Defence Scientific Service First Assistant Secretary, Programmes and Budgets First Assistant Secretary, Force Development and Analysis
Functions:	To review the draft Five Year Defence Programme and annual draft Defence Programme and Estimates proposals and to make recommendations to the Defence Force Development Committee.

Defence Committee

Chairman:	Secretary, Department of Defence
Members:	Chief of Defence Force Staff Chief of Naval Staff Chief of the General Staff Chief of the Air Staff Secretary, Department of the Prime Minister and Cabinet Secretary to the Treasury Secretary, Department of Foreign Affairs

Functions: To advise the Minister on:

the defence policy as a whole;

the co-ordination of military, strategic, economic, financial and external affairs aspects of the defence policy;

matters of policy or principle and important questions having a joint Service or Inter-departmental defence aspect; and

such other matters having a defence aspect as are referred to the Committee by or on behalf of the Minister,

and carry out such investigations as it thinks fit for the purpose of advising the Minister on those matters.

Defence Force Development Committee (DFDC)

Chairman: Secretary, Department of Defence

Members: Chief of Defence Force Staff
Chief of Naval Staff
Chief of the General Staff
Chief of the Air Staff

Functions: To advise the Minister for Defence, in the context of strategic assessments and the most efficient use of resources, on the development of the Defence Force as a whole; and the inclusion in the Five Year Rolling Programme of major weapons and equipment capabilities;

To initiate and review major studies concerned with the development of the Defence Force, and to exchange views, and review progress in the development of the Defence Programme; and

To review matters of common interest to members and review progress in the preparation of proposals and appreciations for submisison to the Government.

Defence Force Structure Committee (DFSC or FSC)

Chairman:	Deputy Secretary B
Members:	Chief of Joint Operations and Plans Chief of Naval Operational Requirements and Plans Chief of Operations - Army Chief of Air Force Operations Executive Controller, Australian Defence Scientific Service First Assistant Secretary, Force Development and Analysis First Assistant Secretary, Programmes and Budgets First Assistant Secretary, Defence Industry and Materiel Policy First Assistant Secretary, Strategic and International Policy First Assistant Secretary, Defence and Works Division, Department of Finance
Functions:	*To provide advice to the Defence Force Development Committee and to participate in decision making on the development of the force structure, Five year Defence Programme and major equipment proposals and to keep these matters under review.*

Defence Operational Requirements Committee (DORC)

Chairman:	Assistant Chief of Defence Force Staff
Members:	Chief of Naval Operational Requirements and Plans Chief of Operations - Army Chief of Air Force Operations Controller, Military Studies and Operational Analysis First Assistant Secretary, Force Development and Analysis First Assistant Secretary, Programmes and Budgets First Assistant Secretary, Strategic and International Policy First Assistant Secretary, Defence Industry and Materiel Policy
Functions:	The consideration of Staff Objectives and Staff Targets likely to become the subject of major equipment submissions and their endorsement for further definition and development.

The consideration, review and endorsement of Staff Requirements for major equipments and, when appropriate, their submission for further consideration by the Chiefs of Staff Committee.

Defence Source Definition Committee (DSDC)

Chairman:	First Assistant Secretary, Defence Industry and Materiel Policy
Members:	Appropriate Chief of Materiel Assistant Secretary Financial Programmes Assistant Secretary Project Development Assistant Commissioner (Operations) Purchasing Division, Department of Administrative Serivces Appropriate Chief of Technical Services (Navy or Air Force, if required) Appropriate Director General Supply (if required) Assistant Secretary Project Planning and Evaluation
Functions:	Analysis and presentation of the objective defence considerations for and against the respective offers of competing manufacturers for the supply of alternative equipments under investigation. Review of equipment acquisition strategies for specific major and the more significant minor equipment projects. Review of proposals for Australian industry involvement. Examination of proposals for capital expenditure in connection with the production of equipment.

2. UNITED STATES

National Security Council (NSC)

Chairman:	President, United States of America
Members:	Vice President Secretary of State Secretary of Defense

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Advisors:	Chairman of Joint Chiefs of Staff Director of Central Intelligence
Functions:	To advise the President with respect to the integration of domestic, foreign, and military policies relating to national security.

Defense Systems Acquisition Review Council (DSARC)

Chairman:	Defense Acquisition Executive, DAE
Members:	Under Secretary of Defense (Research and Engineering) USD (R&E) Under Secretary of Defense (Policy), USD (P) Assistant Secretary of Defense (Comptroller), ASD(C) Assistant Secretary of Defense (Program Analysis and Evaluation), ASC (PA&E) Assistant Secretary of Defense (Manpower, Reserve Affairs and Logistics), ASD (MRA&L)
Functions:	To serve as an advisory body to the SECDEF on the acquisition of major defence programmes and related policies, and to provide the SECDEF with supporting information and recommendations when decisions are necessary.

Department of the Navy Systems Acquisition Review Council (DNSARC)

Chairman:	Cognizant Assistant Secretary
Members	Secretary of the Navy Under Secretary of the Navy Assistant Secretaries of the Navy Chief of Naval Operations Commandant of the Marine Corps Chief of Naval Material
Functions:	To provide a formal mechanism by which the SECNAV will receive counsel of his principal advisors prior to making decisions concerning initiation or continuation of, or substantial change to, major weapons systems acquisition programmes.

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